REPORT RESUMES

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THE JUNIOR COLLEGE AND EDUCATION IN THE SCIENCES. THIRD REPORT IN A SERIES PREPARED FOR THE SUBCOMMITTEE ON SCIENCE, RESEARCH, AND DEVELOPMENT OF THE COMMITTEE ON SCIENCE AND ASTRONAUTICS OF THE U.S. HOUSE OF REPRESENTATIVES. (TITLE SUPPLIED).

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THIS THIRD REPORT ON SCIENCE EDUCATION IN THE U.S. RAISES THREE ISSUES FOR THE JUNIOR COLLEGE--(1) IS IT A DISCRETE RESOURCE IN THE ADVANCEMENT OF SCIENCE EDUCATION, (2) DOES IT REQUIRE A UNIQUE SCIENCE CURRICULUM, AND (3) HOW SHOULD ITS SCIENCE INSTRUCTORS BE PREPARED. UNDER THE COUNCIL OF STATE GOVERNMENTS' "MODEL LAW" (1965), THE COMPREHENSIVE, STUDENT-ORIENTED PHILOSOPHY OF THE JUNIOR COLLEGE IS RECOGNIZED, WITH A CONSEQUENT SCIENCE EDUCATION OFFERING OF, FOR EXAMPLE, ENGINEERING TECHNOLOGY, PRE-ENGINEERING, OR VOCATIONAL-TECHNICAL COURSES, UNLIKE THE CHOICE IN A DEGREE-GRANTING INSTITUTION. THE REPORT FURTHER CONSIDERS THE CRITICAL SIZE OF THE STAFF AND EQUIPMENT EXPENDITURES, COMPARES IT WITH GRADUATE LEVEL INSTITUTIONS WHERE STAFF IS ENGAGED IN SEPARATELY BUDGETED RESEARCH, THE NUMBER AND QUALIFICATIONS OF A REPRESENTATIVE STAFF, AND THE USE OF NONSPECIALISTS. IN SPITE OF HIRING DIFFICULTIES DUE TO LOW PAY AND LITTLE PRESTIGE, STAFF QUALIFICATIONS APPEAR TO BE IMPROVING, AS SHOWN BY THE INCREASE IN ADVANCED DEGREES. THE PRACTICE OF HIRING FOR ALL BUDGETED POSITIONS WHATEVER CANDIDATES ARE AVAILABLE, HOWEVER, MAKES IT DIFFICULT TO ASSESS THE TRUE SHORTAGE OF QUALIFIED TEACHERS. QUESTIONS STILL TO BE RESOLVED, IN LIGHT OF THE HETEROGENEOUS OFFERINGS OF THE JUNIOR COLLEGE, ARE WHETHER SCARCE SCIENTIFIC STAFF RESOURCES ARE BEING DISSIPATED AND WHICH KINDS OF SCIENCE COURSES ARE MOST APPROPRIATE TO THIS SEGMENT OF HIGHER EDUCATION. (HH)

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THE JUNIOR COLLEGE
AND
EDUCATION IN THE SCIENCES

REPORT

OF THE

NATIONAL SCIENCE FOUNDATION

TO THE

SUBCOMMITTEE ON SCIENCE, RESEARCH, AND DEVELOPMENT

OF THE

COMMITTEE ON SCIENCE AND ASTRONAUTICS
U.S. HOUSE OF REPRESENTATIVES
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LETTER OF TRANSMITTAL

House of Representatives,
Committee on Science and Astronautics,
Washington, D.C., June 15, 1967.

Hon. George P. Miller,
Chairman, Committee on Science and Astronautics.

Dear Mr. Chairman: I am forwarding herewith a study prepared by the National Science Foundation entitled "The Junior College and Education in the Sciences." This report was prepared at the request of your Subcommittee on Science, Research, and Development; it is pursuant to your instructions that the subcommittee endeavor to identify and describe, for the Congress, major areas of concern in the overall Government-science complex.

While this was prepared mainly for congressional consumption, and is not aimed at the scientific or educational communities as such, we nonetheless believe that it will be received by them with interest.

The report is the third and last in a series on background, status, and problems of American science education which we have requested the National Science Foundation to undertake over the past several years.

I commend this report to the committee and the entire Congress. I believe it will be a valuable tool in the legislative understanding of educational needs and resources pertinent to the Nation's welfare in science and technology.

Sincerely,

Emilio Q. Daddario,
*Chairman, Subcommittee on Science,
Research, and Development.*

LETTER OF SUBMITTAL

National Science Foundation,
Office of the Director,
Washington, D.C., June 8, 1967.

Hon. Emilio Q. Daddario,
Chairman, Subcommittee on Science, Research, and Development,
Committee on Science and Astronautics,
House of Representatives, Washington, D.C.

Dear Mr. Daddario: I am pleased to submit herewith the third in a series of three reports on science education in the United States as prepared by the National Science Foundation at the request of the Subcommittee on Science, Research, and Development, Committee on Science and Astronautics of the House of Representatives.

The first report dealt with science education at the elementary and secondary school levels. The second report considered science education as carried on in the colleges and universities at the undergraduate and graduate levels. This report focuses attention on education in the sciences in the junior colleges of the United States.

The distinctive and heterogeneous nature of the institutions which constitute the junior colleges of the United States have led to the format of this report which consists of a series of selective "snapshots," each of which considers a discrete aspect of junior colleges relevant to education in the sciences.

The National Science Foundation is willing, of course, to provide such other reports and information as the committee or subcommittee may request.

Sincerely yours,

Leland J. Haworth, *Director.*

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THE JUNIOR COLLEGE AND EDUCATION IN THE SCIENCES

INTRODUCTION

This is the third in a series of reports prepared by the National Science Foundation at the request of the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics of the U.S. House of Representatives. The earlier reports, *Science Education in the Schools of the United States*[1] and *Higher Education in the Sciences in the United States*[2] described, respectively, precollege education in the sciences and college and university education in the sciences. Attention is focused, in the present report, on education in the sciences in the junior colleges.

Factors inherent in the concepts "science education" and "junior college" have presented the Foundation with some problems in the preparation of this report. To the extent that the junior college may be considered an extension of the high school, as some maintain, the precollege report mentioned above provided a description of science education in the junior college. To the extent that this type of institution is an integral part of higher education, as others maintain, the college and university report provided, in essence, a description of education in the sciences in the junior colleges.

The special features of the junior college, ones which make the preparation of a separate report warrantable, stem from the fact that social forces seem to have identified it as the appropriate vehicle for a further advance in the democratization of higher education in the United States. This factor, added to the fact that the earlier reports addressed themselves at least obliquely to education in the sciences at this level, prompts the Foundation to submit a report consisting of a series of selective "snapshots," each focusing on some discrete aspect of the junior college situation having implications for education in the sciences.

The text and the statistical material in sections I through XIII are, in a sense, the "evidence" for a brief description presented in the summary.

Section I ("The Issues," p. 9) reduces to three broad issues the matter of the future involvement of the junior college sector in education in the sciences. First, is there a rationale and a justification for considering junior colleges as a separate and distinct population of institutions for the purpose of advancing the cause of education in the sciences in the United States? Second (and certainly a not unrelated issue), is there actually a need for devising unique types of science curriculums for the junior college sector? The third issue relates to the quantity and quality of junior college science teachers. It is by far the most important issue, and, to a considerable extent, is independent of the other two issues.

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[1] Report of the National Science Foundation to the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House of Representatives, 89th Cong., 1st sess. (committee print, Serial D; Washington, D.C.: Government Printing Office, 1965).

[2] Report of the Subcommittee on Science, Research, and Development of the Committee on Science and Astronautics, U.S. House of Representatives, 89th Cong., 1st sess., prepared by the National Science Foundation (committee print, Serial I; Washington, D.C.: Government Printing Office, 1965).

Sections II through VI are quite general in nature and are not concerned with education in the sciences *per se*. Section II ("Current Situation," p. 21), for example, attempts to present a brief overview of the burgeoning phenomenon which is referred to as the "junior college movement." The situation, however, is so fluid, and subject to such rapid changes, that the use of the word "current" should perhaps be dropped from the lexicon of descriptors of this particular sector of higher education.

Sections III ("Toward Universal College Education," p. 23) and IV ("A Model Law for Junior Colleges and the Land-Grant College Phenomenon," p. 32) are quite self-explanatory. The former section is concerned with the historical advances in educational attainment and the potential for further advances. The latter section suggests the making of a comparison of the "junior college movement" and the land-grant college phenomenon.

Sections V ("A Universe of Junior Colleges," p. 36) and VI ("Growth of Junior Colleges," p. 45) attempt, respectively, to take a limited approach to identifying a rather amorphous entity that can be labeled a junior college universe of institutions, and to put the growth of this phenomenon within a historical perspective.

In sections VII through XI, the institution, on the one hand, and the science teacher, on the other, are considered as resources for the science enterprise. Section VII ("The Junior College as a Resource for Science," p. 50), for example, looks at the junior college universe in connection with selected science-expenditure and scientific-manpower variables.

The four following sections, VIII through XI, are concerned specifically with junior college faculty, and predominantly with science faculty. The faculty situation is stressed advisedly. The problem of education in the sciences within the junior colleges is overwhelmingly a problem of quality and quantity of staff. Section VIII ("Junior College Staff as Scientists," p. 56) presents selected data on junior college personnel who participate in the National Register of Scientific and Technical Personnel. Section IX ("Junior College Science Faculty, Spring 1966," p. 63) analyzes data on junior college science teachers who were included in the Registry of Junior College Science & Mathematics Teachers of the American Association of Junior Colleges in the spring of 1966. Sections X ("Newly Hired Junior College Faculty," p. 70) and XI ("New Junior College Faculty," p. 74) analyze recent data dealing with, respectively, "newly hired" teachers (i.e., those who were new to a given position in the study reference year) and "new" teachers (i.e., those who were part of the junior college teaching corps for the first time during the study reference period).

Section XII ("Junior College Students," p. 84) is concerned, briefly, with various characteristics of potential and actual junior college students in general, and, in greater detail, with the transfer student.

Section XIII ("The Programs," p. 100) briefly describes the range of programs offered by the more comprehensive junior college.

A word of caution should be injected at this point. The vaunted heterogeneity of education and of educational institutions in the

United States is nowhere more in evidence than in the junior college sector. The differences among institutions within States, particularly within those having neither master plan nor coordinating body, and among States are so marked that presenting what purports to be a national overview is more than a little hazardous.

Stemming from this and other factors (such as the form in which data are available), the junior college has not been rigidly defined in this report. The terms "junior college," "2-year institution" (sometimes including, and at others excluding, the technical institute), "non-degree-granting institution" (i.e., "non-baccalaureate-degree granting")—are all used interchangeably. This inevitably results in some confusion—a confusion, however, that must to a considerable degree be attributed to the situation, and only a lesser degree, to the inadequacy of statistics.

The reader will find the report most useful if he views each section as a rather separate and discrete entity, and attempts to obtain, from the whole, general impressions rather than concrete specifics.

SUMMARY

It is to the 2-year institution, and, more especially, to the community junior college that America is turning further to advance the democratization of college education in the United States. The reconciliation of the maintenance and improvement of quality, on the one hand, with the expansion of educational opportunity, on the other, poses a threat to rigor in education and presents a challenging opportunity.

The capacity for absorbing larger and larger enrollments is one of the most striking features of the 2-year college segment of higher education. Related to this seemingly infinite capacity is a ready responsiveness to student needs which gives rise to a heterogeneous student body, a comprehensive program, a uniquely qualified staff, and an uncrystalized conglomeration of institutions. The junior college, and more particularly the community junior college, places great emphasis on satisfying felt local educational (and "cultural") needs: There is an absence of preconceived notions of what is or is not collegiate subject matter, of what is or is not college material.

The absence of uniformity in local needs has conditioned the coming into being of a heterogeneity of institutional types: a junior college in a large city system (perhaps one unit in a multiunit organization under a central administration); a single institution in a smaller urban area, with broad community college concepts and programs; a junior college in a multicampus district, with already-planned-for companion campuses; a private church-related junior college; a rapidly growing college in an essentially nonurban area; a technical college or institute; a nonurban college, with the administrative organization still a part of the public school system; a junior college moving with difficulty toward the establishment of a greater measure of local control, a separate board of trustees, and greater local financial support; a 2-year independent college for women; a rapidly growing public junior college, one of a State system, with a State board and local advisory committees; an independent junior college moving toward public support; a coeducational, largely residential college; and so on.

What considerations are relevant to education in the sciences in such a conglomerate of institutions? As a first approximation, these can perhaps be reduced to three: (1) Should the junior college segment of higher education be singled out for special treatment as a resource for education in the sciences, i.e., as something apart and distinct from other higher educational institutions? (2) What kinds of science programs are appropriate for this universe of entities? (3) Given the indisputable fact of significantly larger junior college enrollments in the future, to say nothing of a greater number of junior colleges, the question of improving the quality (and increasing the number) of science teachers to staff these colleges appears to be one of most critical importance.

One of the most remarkable educational phenomena of the last decade or two, junior colleges are being established at a rate of about one per week. To talk in terms of a "current" situation becomes hazardous. The American Association of Junior Colleges estimates that, were all States to follow the lead of California, which has been a leader in the junior college "movement," American junior colleges would have an enrollment of 6.5 million by 1975, approximating the current enrollment in all higher educational institutions. This would entail an expenditure of some $5 billion during the next 10 years, and a requirement for 100,000 more junior colleges teachers to staff 1,000 institutions.

When the States which appear most active in following California's example (Florida, Illinois, New York, New Jersey, Michigan, and Pennsylvania) emulate California's achievement, a junior college education will be readily available to a population of 80 million, more than 40 percent of the Nation's total. In addition to activity at the State level, many urban areas are developing multicampus junior college operations to insure ready accessibility to commuting students. Although most of the action is in the public sector, independent and church-related junior colleges are also planning and building for the future. Such schools cannot compete with the public schools; they plan to concentrate on what they feel they can do best: provide good teaching and counseling services to smaller but no-less-important populations of students than do the larger public institutions.

The identification of the 2-year institutions as a positive approach to the growing demand for postsecondary education is reflected in the provisions of a "model law" promulgated by the Council of State Governments. The realization of the American educational ideal of providing the opportunity of at least 2 years of college for all citizens awaits the adoption and implementation by the several States of its major provisions. Primarily student oriented (and only secondarily curriculum oriented), its goal is to provide within commuting distance of all potential students whatever programs are suited to their needs.

There are a number of elements of similarity between the land-grant college phenomenon and the junior college movement. The former, it has been said, applied to higher education "the challenge of useful relevance." Can not the same be said of today's junior college situation? In terms of social pressures, of needed educational programs, of the existence of educable populations, of the existence of a dynamic, activist association (the American Association of Junior Colleges)—the ingredients exist for an advance in the democratization of college education to rival that which was brought about by the land-grant college legislation.

The purpose of the land-grant college was "to promote the liberal and practical education of the industrial classes * * *" The intent of the model law is to provide an opportunity for a liberal and practical education for every citizen within commuting distance of his home. In terms of programs: The land-grant college was "without excluding other scientific and classical studies * * *, to teach such branches of learning as are related to agriculture and the mechanic arts;" the suggested model law would have the junior college offer "specialized and comprehensive programs * * * which may include but need not be limited to courses in technological and occupational fields or courses in the liberal arts and sciences, whether or not for college credit."

The first 2-year college was established more than a half century ago. Until the 1930's most such colleges were private and almost entirely academic in orientation. Offering programs similar to the lower divisions of 4-year institutions, they became known as "junior" colleges. Since the 1920's and 1930's public institutions, most of which offer a considerably more varied program than the private institutions, have been established at an ever-increasing rate.

Increasingly, junior colleges have absorbed larger segments of higher education enrollments: 1.4 percent in 1920 (U.S. Office of Education data for "degree-credit" enrollments); 10.0 percent in 1940; 12.1 percent in 1960; 15.2 percent in 1965; and (the U.S. Office of Education conservatively estimates) 16.9 percent in 1975. The rate of increase is somewhat more marked when junior college enrollments are related, not to *total* higher education enrollments, but to *undergraduate* higher education enrollments: 1.4 percent (1920), 10.8 percent (1940), 12.5 percent (1960), 17.0 percent (1965), and 19.2 percent (1975). Junior colleges presently account for perhaps more than 30 percent of all *lower division* enrollments in higher education.

Although composed predominantly of degree-credit students, the student body of the junior college, and particularly of the more prevalent community junior college, is a very heterogeneous one, reflecting, as it does, the "open door" policy of admissions. Among the students one finds: young high school graduates who want 2 rather than 4 years of a college education (in the arts and sciences, or in technical, vocational, or semiprofessional programs); students bound for 4-year colleges who want to spend their lower division years in their own community (living at home); young adults who have not graduated from high school or who, through part-time study, hope eventually to obtain a baccalaureate; workers who want to improve their skills (in preparation for advancement or change of employment) or to further their general education; housewives interested in homemaking, childcare, general education, or preparation for either employment or re-employment; and elder citizens seeking to develop new interests in a wide variety of adult education courses.

The preponderance of transfer enrollments notwithstanding, only about a third of the students who enter junior colleges transfer (within a period of 4 years) to a 4-year institution; somewhat less than half of those who succeed in transferring graduate (within 2 years); and somewhat fewer than two-thirds graduate within 3 years of transfer.

As would be expected, junior college students, on balance, come from lower ability levels (and lower socioeconomic strata), and are less academically motivated than are lower division students in 4-year institutions. By the time junior college transfers graduate from 4-year institutions, however, there appears to be little difference between them and "native" students in terms of achievement and in terms of field distribution. A smaller proportion of transfer than of native (nontransfer) students, however, expect to do graduate work.

Given the diversity of students, it is readily evident why the junior college is sometimes described as being "many things to many people." (The unkind critic, to say nothing of some staunch supporters of the junior college movement, is tempted to ask whether it were not attempting to be "all things to all men.") A concomitant of this is, of course, a seeming proliferation of programs.

Reduced to essentials, junior colleges offer a triad of programs, namely, transfer, terminal, and continuing education. A few junior colleges prescribe a common liberal arts program, with elective options, for almost all transfer majors. More frequently, however, lower division programs ostensibly provide for some measure of specialization which will be accentuated in upper division programs. Terminal programs are available for numberless occupations. Adult programs abound, usually as specialized evening courses. Transfer programs, which predominate, have terminal counterparts.

Of particular interest to the science community is the engineering technician curriculum. This is most generally terminal in nature, providing instruction in theory and applications related to science and technology. It is not to be confused with pre-engineering instruction, in which courses are designed to prepare the student for further study leading to a baccalaureate. Neither is it to be confused with vocational-technical education at either the junior college or high school level. These latter programs are designed to train craftsmen with varying but lesser degrees of skill. The availability of the several options on a single campus affords the student the opportunity to move readily from one level to another, particularly as he becomes better acquainted with each option and with his own capabilities and interests.

A rough indication of the resources available for education in the sciences within the junior college segment of higher education for the education and training of a diverse population of students can be made by reference to selected expenditure and manpower variables.

Although junior colleges constitute a major segment of higher education in terms of number of institutions (about one-third), their resources for science, in terms of expenditures and manpower, are meager. Their share of expenditures for separately budgeted research and development, in 1963–64, was one-tenth of 1 percent of the total for all colleges and universities; for science "plant," 3.7 percent; and for instruction and departmental research, 4.8 percent. Slightly more than 8 percent of total professional staff, and 5 percent of full-time-equivalent scientists and engineers were on junior college campuses.

The question of critical size injects itself. On the average, the junior college has on its staff 16 full-time-equivalent scientists and engineers. Hundreds of junior colleges have fewer than a half dozen full-time-equivalent scientists and engineers. What is critical size in terms of, say, at least salutary, but possibly necessary, "colleagueship"?

The junior college teacher is in need of versatility extending beyond academic competence or technical competence in nonacademic subjects. Confronting a student body with a wider range of student abilities, motivations, and interests than his colleague in the 4-year institution, the junior college teacher must be *both* guidance counselor *and* teacher.

The type of science he is involved in depends upon the fullness and comprehensiveness of the junior college's offerings, that is, on the number of options the student has in transfer education, occupational education, general education, and continuing education. Reflecting these different options, the teacher of biology, say, may in the future be concerned with five "tracks": (1) for prebaccalaureate biology majors, (2) for prebaccalaureate nonscience majors, (3) for associate degree programs for biologically based careers, (4) for associate degree programs for nonbiologically based careers, and (5) for continuing education.

Relatively few junior college teachers participate in the National Register of Scientific and Technical Personnel (maintained by the National Science Foundation). Of the 224,000 scientists in the 1964 register, almost 80,000 were employed by higher educational institutions. Of these, in turn, fewer than 2,000 were on the staffs of junior colleges. Almost half of all higher education scientists reported having received support from the Federal Government as compared with fewer than one-fifth of junior college scientists. Of the latter, more than one-half were receiving such support from "education" programs. The greatest number (about one-third) of higher education scientists taken as a group received support from "health" programs.

The importance of the junior college movement in California is supported by data on the distribution by State of National Register scientists. This State accounts for just slightly more than one-tenth of all higher education scientists, but for almost one-third of junior college scientists. New York, which ranks second in terms of incidence of register scientists, on the other hand, has slightly more than one-tenth of both higher educational scientists and of junior college scientists.

In terms of academic attainment, most junior college science teachers, about seven-tenths, have a master's degree; somewhat fewer than one in 10 hold the doctorate; and about one in seven, the baccalaureate. About nine in 10 have degrees in a subject-matter field (as contrasted with "education" or "administration"): about two-thirds of the doctorates, seven-tenths of the master's, and three-quarters of the baccalaureates.

The high school, the predominant source, supplies about three-tenths of the junior college teachers. The graduate school, college and university teaching, and business occupations (in descending order of importance as sources) together furnish somewhat more than half of the new teachers. The most prolific source of supply (more than one-quarter) for the nonpublic junior colleges is the graduate school.

About three-tenths of all junior college teachers are women (as contrasted with, respectively, about one-half of the high school teachers, and almost nine-tenths of the elementary school teachers). Women play a lesser role in the teaching of science subjects, than in the teaching of nonscience subjects, in junior colleges.

There is a significant difference between public and nonpublic institutions in the distribution of science teachers by field of science.

About one-quarter of those in public institutions, for example, are in the behavioral sciences, about one-third of those in nonpublic institutions. Relatively twice as many public, as private, teachers are in "technology." Somewhat more than one-quarter of the public, and somewhat fewer than one-quarter of the nonpublic, teachers are in the natural sciences.

The relative emphasis, in terms of numbers of science staff, on the natural and biological sciences is fairly equal when junior colleges are classified on the basis of enrollment size. There appears to be, however, a greater emphasis on "technology" in the larger (and predominantly public) schools. The accent in the smaller (and predominantly private) schools is, on the other hand, relatively greater on the behavioral sciences.

The onerous task which confronts the recruiter of junior college staff is told in figures on mobility. (The recruiter of new junior college staff is generally a president or a dean. Even in the larger junior colleges this function is performed by departmental chairmen to a lesser extent than is customary in 4-year institutions.) About one-quarter of all new junior college teachers are new to a given junior college campus in a given year. The junior college is much less successful than is the liberal arts college or the university in retaining staff. Of the staff that was hired by universities in a recent year, almost two-thirds were attracted from *other* universities. The corresponding figures for liberal arts colleges and junior colleges, respectively, are somewhat more than one-half and about three-tenths. Junior colleges were successful in attracting only 5 percent of liberal arts faculty, and only 2 percent of university faculty, who made a change.

Among the more important reasons given for leaving a given junior college were inadequacy of salary, disenchantment with junior college "administration" (broadly defined to include administration at all hierarchical levels), excessive teaching load, and (of particular relevance to education in the sciences) inadequate research facilities and research opportunities.

There is greater stringency in the availability of new junior college teachers in science, than in nonscience, fields. The shortage fields, in order of severity, appear to be the physical sciences, mathematics, engineering, business education, psychology, religion-philosophy-law, and "vocational subjects"; the surplus fields: physical education, business, the biological sciences, English, foreign languages, the social sciences, fine arts, and history. Junior college officials consider the present situation with respect to the availability of science teachers to be critical; they fail to see any amelioration as they look into the future.

Many factors condition the frenetic activity at the 2-year sector of higher education. Most important among these are, in ascending order of importance, larger numbers of individuals in the relevant age groups; the assumption by the 2-year institutions of an ever-increasing responsibility for the training of lower division transfer students; the assumption by 2-year institutions of the responsibility for "continuing" education and for (less than baccalaureate) terminal-occupational education; and, most importantly, further advances in the democratization of education.

Public (State and local jurisdictions) and private bodies are planning and implementing plans for absorbing increasing enrollments in "commuter" colleges. The early college was a place for "resident" students. With the coming of extension services, the college sent its professor to the student. With the advent of the community-junior college, the college itself has finally come to the student.

To quote a popular refrain, the 2-year sector of higher education "is busting out all over." This phenomenon reflects an attempt on the part of society to deploy higher educational resources as efficiently as possible. The question at issue is whether the junior college sector can accommodate to its increasing responsibilities; whether it can responsibly discharge its responsibilities to the American public.

I. The Issues

It is to the public community-junior college that the American public is turning to contain what have variously been referred to as future hordes and as stampedes of college students. Unfortunately, one is often left with the impression that the subject matter is preventive medicine and not human resource development. The reconciliation of the maintenance and improvement of quality in education, on the one hand, with the expansion of educational opportunity to increasing numbers of students, on the other, is both a threat to rigor in education and a challenging opportunity.

Even among junior college people, there is a fear that the junior college may be gorging itself with an excess of responsibilities and functions. Transfer education, guidance, general education, technician-type training, adult education, craftsman-type training—constitute a very comprehensive program for a single institution. Is the societal need and the societal instrument for satisfying that need well met on the junior college campus? Or, in an age of specialization, is such comprehensiveness somewhat an anachronism? Educational entrepreneurship and educational statesmanship of the highest order are needed to guarantee that the junior colleges which will dot the countryside in greater profusion in the near future will constitute a strengthening of the Nation's educational enterprise.

The capacity for expansion of the junior college sector of higher education is one of its most striking features. At a time when higher education is being pressed to serve more and more students, the junior colleges are, each year, absorbing a larger fraction of the total student population. Related to a seemingly infinite capacity is an open responsiveness to the needs of students which gives rise to both a heterogeneous student body and an innovative pattern of instructional activities.

It is not surprising, therefore, that the community college—the locally supported junior college which has pioneered the "open door" and the responsive curriculum at the postsecondary level—has a justifiable and politically secure claim on local support. It would appear that the combining of transfer, terminal-occupational, continuing education, and community service activities has produced a kind of institution which combines some of the features of an affluent public high school and a public 4-year college or university.

But, one authority maintains, the "community junior college is not just secondary education, deserving the epithet 'glorified high school.'

Nor is it only higher education, as described by the phrase 'decapitated college.' "[3] He proceeds to an "idealistic definition" of a community college as "a free public 2-year educational institution which attempts to meet the post-high-school educational needs of its local community * * * . The emphasis * * * is on providing legitimate educational services, rather than on conforming to preconceived notions of what is or is not collegiate subject matter, or of who is or is not college material."

Indefiniteness of definition makes it somewhat difficult to identify the junior college universe of institutions as an appropriate target population in terms of the national scientific enterprise. The exceeding heterogeneity of the elements within the universe compounds the difficulty. The author of a recent study [4] categorized the sample of institutions which he visited (warning the reader that "subcategories are not listed") as follows: A college in a large city system (one unit in a multiunit organization under one central administration); a college in an urban area, with a broad community college concept and programs; a multicampus district, with already planned additional campuses; a private, church-related college; a rapidly growing college in an essentially nonurban area; a technical college or institute; a nonurban college, with administrative organization still a part of the public school system; a college moving with difficulty toward establishment of greater local control, separate board of trustees, and greater local financial support; a 2-year, independent college for women; a rapidly growing public college, one of a State system, with State board and local advisory committees; an independent college moving toward public support; and, finally, a coeducational, largely residential college.

We have here an amorphous universe of institutions, student centered and, in the main, locally oriented. Not inconceivably, the junior college of today is in the same stage of development as the comprehensive high school of several decades ago. We have comprehensiveness of program in an age of specialization; local orientation in an international world (and, in the case of science, for an international discipline and language).

The considerations relevant to education in the sciences in the junior colleges can, as a first approximation, be reduced to three issues:

(1) Should the junior college universe of higher education institutions, as institutions, be identified and singled out for special consideration as a resource for education in the sciences?

(2) What kinds of science curriculums are appropriate for this amorphous entity?

(3) Whatever the resolution of the first two questions—the issue of improving the quality (and increasing the number) of junior college science teachers appears to be of critical importance.

The junior colleges, as such, are not, as a rule, singled out as a target population in Federal legislation, the Higher Education Facilities Act being a notable exception. (The prevailing sentiment in Washington seems to be that chances for additional higher education legislation are better if higher education presents a united front; that, in the past, higher education has spoken with too many voices.) As a result of difficulties of definition, junior colleges have, on occasion, partaken of the best of two possible worlds, participating in Federal programs both as higher educational institutions and as high schools. In other instances, however, uncertainty of status has redounded to their disadvantage.

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[3] John W. Thornton, Jr., *The Community Junior College* (New York: John Wiley & Sons, Inc., 1960), p. vii.

[4] Roger H. Garrison, *Junior College Faculty: Issues and Problems* (Washington, D.C.: American Association of Junior Colleges, 1967), p. 14.

Were an education in the sciences program to be designed specifically for junior colleges, as institutions, it would, of course, be appropriate for the National Science Foundation to be involved. Portions of the National Science Foundation Act of 1950, as amended (Public Law 507, 81st Cong.), relevant to education in the sciences read as follows:

> SEC. 3. (a) The Foundation is authorized and directed—
>
> (1) to develop and encourage the pursuit of a national policy for the promotion of basic research and education in the sciences;
>
> (2) to initiate and support * * * programs to strengthen scientific research potential in the mathematical, physical, medical, biological, engineering and other sciences * * *
>
> * * * * *
>
> (4) to award, as provided in section 10, scholarships and graduate fellowships in the mathematical, physical, medical, biological, engineering and other sciences;
>
> SEC. 13. (a) The Foundation is hereby authorized to cooperate in any scientific activities consistent with the purposes of this Act * * * the Foundation may undertake programs granting fellowships to, or making other similar arrangements with, foreign nationals for scientific work in the United States * * *

Over the years the Foundation has construed this statutory mandate to mean that it has a continuing responsibility to—

Encourage and prepare students for careers in science.

Improve science teaching as a component of general education.

Up to the present, however, the National Science Foundation has not designed any programs specifically for the junior college sector. At times, however, changes have been made in a given program which have benefited junior colleges to a greater extent than other types of institutions. A case in point is the division, some years ago, of the science faculty fellowship program into two competitions, one for faculty with doctorates, and the other for faculty without doctorates. In view of the fact that a preponderance of junior college faculty fall into this latter group, the change provided a greater opportunity for participation on the part of junior college teachers, in that they were not required to compete against faculty who held doctorates.

As a result of such provisions, the junior college universe, although not singled out specifically as a target population, has participated in National Science Foundation programs to a not inconsiderable extent. Illustratively, and in terms of science faculty programs for the fiscal year 1965: Almost one-fifth (18.7 percent) of the almost 5,000 participants in National Science Foundation science faculty training programs were junior college science teachers. At least one staff member from almost three-fifths (58.1 percent) of all junior colleges was among the participants (table I–1, p. 20).

For the future, the identification of the junior college sector as a target population for programs in science education would be aided were a thorough assessment of the science-education role of the junior college possible. At the present time (January 1967), and for the first time, data on the basis of which such an assessment can be made (in the field of mathematics) are being generated by the Conference

Board of Mathematical Sciences by means of a "Survey of Programs in the Mathematical Sciences: 1966–67." The Conference Board defines mathematics to include applied mathematics, statistics, and "computers." It is attempting to obtain information of the following nature:

(1) The extent of offerings in transfer, noncredit, and remedial programs;

(2) The extent to which the same course is given in both the transfer and noncredit programs;

(3) The way in which mathematics is administered (a mathematics department, a combined science and mathematics department, no departmental structure, etc.);

(4) The type of texts used;

(5) The extent to which, and manner in which, mathematics is taught in divisions or departments, other than those having primary responsibility for it;

(6) The inclusion of mathematics in an entrance examination, if any is required;

(7) The existence, content, and purpose of placement examinations in mathematics, if any;

(8) The existence of a program of advanced standing;

(9) The existence and extent of activities, the objectives of which are to stimulate interest in mathematics;

(10) The availability of equipment;

(11) The extent of the use of techniques other than lecture-recitation;

(12) The academic attainment in mathematics of mathematics faculty.

In the absence of a body of such data for a sampling of science fields, it is difficult to make a judgment as to the merit of institutional programs for science education in junior colleges. The very fact of the absence of such data, to some extent may be indicative of the preoccupation of junior college administrators with the very onerous logistics task which has been, and continues to be, a concomitant of the continuing advances in the democratization of higher education. (The difficulties incident to defining a major in science at the junior college level continue, of course, to pose problems for the gatherers of data.) Whether or not the junior college can or should be singled out as a target population for science-education programs does not alter the fact that, given the fact of a diversity of students and of a comprehensiveness of offerings, there are various types of science being offered by junior colleges. What types should be offered?

The National Science Foundation and other agencies have funded curriculum studies which are having a tremendous impact on education at all levels. Specifically, in terms of the college level, eight commissions, with NSF support, are serving as instruments through which leading scientists provide stimulation, guidance, and direction to the academic community in the improvement of undergraduate instruction in various scientific disciplines. The commissions are listed below, along with the date of initial NSF support to each:

CCP—Commission on College Physics (December 1959).

CUPM—Committee on the Undergraduate Program in Mathematics (June 1960).

CEANR—Commission on Education in Agriculture and Natural Resources (April 1962).
CEGS—Council on Education in the Geological Sciences (April 1962).
CEE—Commission on Engineering Education (April 1962).
ACCC—Advisory Council on College Chemistry (June 1962).
CUEBS—Commission on Undergraduate Education in the Biological Sciences (March 1963).
CCG—Commission on College Geography (June 1963).

The specific objectives of these commissions are: (1) to serve as a bridge between research and the college curriculum; (2) to accelerate the rate of change toward improvement of undergraduate instruction in the respective fields; (3) to interest senior professional (especially research) personnel and able younger men in teaching problems; (4) to encourage material experimentation with the curriculum; and (5) in fields where problems are numerous, to establish priorities, and generate a sense of direction.

Detailed studies are undertaken to define science education problems, especially those of courses and curriculums, and to develop recommendations for their solution. Some examples of studies: identification of trends, undergraduate curriculums (such as curriculums for preparation of future teachers at each level, for varieties of future professionals within and outside each discipline, and for future nonscientists), faculty development, institutional development, facilities, and instructional materials.

Encouragement and guidance is given to institutions and interinstitutional groups to initiate and implement new projects such as development of instructional materials and courses. (The commissions attempt to avoid producing materials except in those special cases that require pilot materials development by groups able to mobilize outstanding members within specific professions.) Discussion of needs in science education is generated among teachers, research scientists and administrators Efforts are made to facilitate communication among members of the professions as well as to improve dissemination of information, both disciplinary and interdisciplinary. Groups in each commission consult and work with people from other disciplines on problems of mutual concern and interest, and in some cases have formed interdisciplinary panels with continuing cooperative responsibilities.

The foregoing paragraphs summarize the objectives and activities of the college commissions in a general way. The paragraphs which follow will describe the activities specifically related to the "junior college" of (1) individual commissions, and (2) of the Intercommission Panel on Science in the Two-Year College, which includes representatives from each of the eight commissions.

As a beginning, individual commissioners of the Commission on College Physics have worked with the California junior college system and with the New York State junior colleges. Discussion is taking place and steps have been taken which may lead to the establishment of a panel.

A panel is currently being organized within the Committee on the Undergraduate Program in Mathematics. It will have three subpanels: (1) Mathematics programs for university parallel students, (2) mathematics programs for technical and occupational students, and (3) general mathematics for terminal students.

A Panel on Two-Year Institutions is being established within the Commission on Education in Agriculture and Natural Resources to concern itself with (1) the quality of the trasnfer (college parallel) program, (2) the quality of the terminal program, and (3) problems encountered when the "terminal" student transfers into a 4-year program.

The Committee on Chemistry in the Two-Year Colleges of the Advisory Council on College Chemistry is concerned with five types of institutions: (1) the public comprehensive, community colleges; (2) the public junior colleges; (3) the private junior colleges; (4) the technical institutes; and (5) the 2-year branches of universities. During the next 2 years, the committee plans to prepare suggestions and provide consultants on the development of chemistry programs, to devise special short courses for faculty, to promote faculty research and to develop a library list.

The Panel on Biology in the Two-Year Colleges of the Commission on Undergraduate Education in the Biological Sciences was established early in 1966. It will concern itself with five tracks in biology for junior college students: (1) prebaccalaureate biology majors, (2) prebaccalaureate nonscience majors, (3) associate degree programs for biologically based careers (i.e., agriculture, nursing, dental technicians), (4) associate degree programs for nonbiologically based careers (i.e., automotive mechanics, bookkeeping), and (5) continuing or adult education.

Finally, at the April 12, 1966, Ann Arbor meeting of the Intercommission Panel on Science in the Two-Year College, there was general agreement that the junior college is an educational element which is growing in importance and deserving of the commissions' attention. The proposal for a junior college joint panel was agreed to and this intercommission working group was established to consider those problems in science instruction unique to the 2-year colleges. This panel is administered by CUEBS, and chaired by Dr. William Mooney of ACCC. The group consists of one or two representatives from each relevant commission, plus representatives of appropriate organizations (i.e., American Association of Junior Colleges, American Association for the Advancement of Science, American Psychological Association). It met September 2–3, 1966, and presented minutes and recommendations in late October. Working groups reported on (1) transfer programs, curriculum, and articulation between the 2- and 4-year institutions; (2) occupational programs; and (3) teacher development. Each commission will report actions of its 2-year college panel, and it is tentatively suggested that the panel meet 1 year hence to discuss activities of the individual commissions and to identify problems that extend beyond the concerns of any single commission.

The great current interest in junior colleges has served to focus attention on junior college curricular problems which have existed and continue to exist on 4-year campuses. The results of the efforts of the Panel on Biology in the Two-Year Colleges, for example, will be awaited with considerable interest by 4-year institutions, many of which have all, or some combination of, the "five tracks in biology" which are absorbing the panel's attention. In a sense, it is a case of the "junior college problems" of senior colleges, so to speak, being somewhat less visible than the junior college problems of junior colleges.

It is to be hoped that these several efforts will bear early fruit. It would immeasurably advance the cause of education, in general, and of science education, in particular, were it possible to experiment with an integrated five-track content package (superimposed on ability tracking in the larger junior colleges) in a sampling of the many new junior colleges being founded annually. There might then be greater merit in identifying the junior college sector as a target population for a joint effort in the National Science Foundation's attempt to discharge its continuing responsibility to—

Encourage and prepare students for careers in science.

Improve science teaching as a component of general education.

Among the perennial problems facing higher education in this country is the training (preservice and inservice), recruitment and retention of teachers. These problems are especially acute in the sciences since, in recent decades, other segments of our society have exerted increased demands on the Nation's scientific manpower supply. The problems are particularly pressing in junior colleges. The use of relatively large numbers of part-time faculty and the use of faculty with less than complete training may be dictated in many cases—and particularly in the sciences—by a choice between a less than satisfactory response to the pressures of numbers and no response at all.

If the total pool of qualified professionals in science and in the social sciences and humanities can be increased, the total junior college faculty situation will almost certainly improve. The private junior colleges represent a possible exception since they seem to be facing the frustrating situation of needing staff and, at the same time, needing additional resources if they are to pay competitive salaries.

Obviously, also, the present junior college faculties could and would use additional opportunities for further education and training. In some cases, part-time faculty members are young graduate students recruited from nearby universities who, with added training and the experience they are gaining in junior college instruction, would be prime candidates for full-time positions.

The pressures to use various technological ways of extending the current faculties are already noticeable. New educational technology is making possible economies in the use of faculty in many institutions through such devices as closed circuit television, films, tapes, and programed lessons presented by a variety of autotutorial systems.

However, the whole question of college teacher preparation, particularly in view of the burgeoning junior college growth, is in some need of restudy.

> The belief that master's degrees and graduate majors and doctor's degrees constitute the necessary requirements for the profession of college training has been questioned from time to time but no alternative has become generally acceptable. No other major professional group in the country has been able to maintain its public support with as little in the way of organized professional preparation as the college teaching profession.[5]

As for the preparation of teachers specifically for the community college level, there have been two approaches. Where such institutions were extensions of the public school system, the tendency has been to seek teachers with backgrounds similar to those of high school teachers; where the community college was established with sponsorship other than the local school board, the tendency has been to seek teachers with backgrounds similar to those of college teachers.

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[5] William J. Haggerty, "Significance for High School and College Teacher Preparation," in Earl J. McGrath, ed., *Universal Higher Education* (New York: McGraw-Hill Book Co., 1966), p. 190.

> Probably neither of these alternatives is a good one at the present time. On the other hand, the legitimate criticisms of the present programs for the preparation of secondary school teachers would apply with even greater force if these programs became the main source of securing community college teachers. On the other hand, the assumption that the Ph. D., or some point on the road to the Ph. D., is the best possible measure of a person's qualification to be a college teacher is also of doubtful value. It is probably not even a good measure of the qualifications of a person who teaches students in the upper levels of college and university. At any rate, the universities turning out Ph. D.'s cannot provide enough personnel to come anywhere near meeting the need for all the new college teachers that will be required. With neither of the presently existing alternatives adequate and with the very large numbers of teachers that will be needed, particularly at the level of the first 2 years of college, within the next decade and beyond, it would seem to be singularly appropriate and timely for those concerned with the problem to put forth a major effort to devise, as a matter of national policy, an appropriate new program for the professional preparation of community college teachers.[6]

A recurring theme in the literature on the preparation of junior college teachers is the need for special preparation extending beyond academic competence or technical excellence in nonacademic subjects. It is felt by many that the junior college teacher encounters a wider range of student abilities, motivation, interests, and achievement than is usually found in the lower division of 4-year institutions with more highly selective admissions requirements. For this reason, the junior college teacher must combine a strong guidance component with academic and teaching proficiency. The junior college instructor works with many students who are misdirected or uncertain of their career goals; with students who require opportunities to repair weak backgrounds; and with those who frequently respond more readily to the practical than the theoretical.

One authority itemizes as follows the elements which the preparation of a community college teacher should include:

> (1) The philosophy and place of the junior college.
> (2) Organizing and administering junior colleges.
> (3) The junior college curriculum.
> (4) The psychology of post- or late-adolescence.
> (5) Student personnel problems in junior colleges.
> (6) Methods of teaching in junior colleges, and.
> (7) Apprentice or practice teaching.[7]

Another authority asserts that a teacher in a 2-year college should—

> (1) Have had enough experience * * * to enable him to approach his teaching task with confidence in self and with respect from students and colleagues,
> (2) Be a scholar in the true sense of the word,
> (3) Be able to teach effectively,
> (4) Understand and accept the functions of a 2-year college if he is to work effectively in that structure, and
> (5) Understand and accept his place in the community served by his college.[8]

It is from an overexposure, perhaps, to literature on the necessity for the junior college teacher to be uniquely prepared that the reader may be pardoned if he suggests that (particularly for science teachers) such precepts be restudied. The junior college has, on occasion, been categorized as an *administrator's* institution: such precepts may be at least in part a reflection of a fervent wish on the part of the harried administrator that a reservoir of such potential teachers exist. The onerous task of recruitment and retention of junior college teachers might then be brought within manageable bounds.

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[6] William J. Haggerty, "Significance for High School and College Teacher Preparation," in Earl J. McGrath, ed., *Universal Higher Education* (New York: McGraw-Hill Book Co., 1966), pp. 190-191.

[7] John W. Thornton, *The Community Junior College*, quoting Koos, p. V.

[8] James L. Wattenbarger, "What Should Be The Essential Qualifications of a Teacher in a Two-Year College?" *Current Issues in Higher Education, 1958*, National Education Association, Association for Higher Education, p. 202.

The fact that there may be merit in considering the junior college an administrator's college (and, incidentally, the American Association of Junior Colleges an administrator's organization) may not be unrelated to a recent development of some significance and relevance to the issue of junior college faculty:

> A National Committee for Junior College Faculty, to serve as a task force on problems of the junior college teacher, is recommended in a foundation-sponsored report published January 12 by the American Association of Junior Colleges. The author is Roger H. Garrison, former vice president and teacher at Briarcliff College.
>
> Garrison, whose 14-month study included interviews with 700 faculty members at junior colleges, suggests that a 12-member national panel of prominent representatives of 4-year colleges and universities and 2-year colleges concern itself "especially with the problems of the preparation and professional refreshment of 2-year college teachers."
>
> Among matters that could be on the working agenda of the committee, he said, are the following: (1) Develop guidelines for graduate work appropriate to the training of teachers; (2) create patterns for special institutes, seminars, and conferences for the continuing professional refreshment and upgrading of faculty; (3) develop recommendations pertaining to faculty load, problems of instruction inherent in the teaching of large groups, effective organization of academic departments, and similar matters; (4) examine the range of professional organizations and their relationships to junior college faculty; and (5) be the sponsoring committee for special workshop meetings organized to attack specific problems. He suggests that staff work for the committee be provided by the AAJC.
>
> Garrison said that a number of junior college teachers and administrators also favor the creation of a Center for Junior College Studies for the study of problems of 2-year colleges and development of programs for their long-range solution.
>
> In the report, sponsored by the United States Steel Foundation, Garrison states that the junior college teacher "is—or may be becoming—a new breed of instructor in higher education. Markedly different in significant ways from the usual situation of his 4-year colleagues are his conditions of instruction, his aims, and his professional-philosophical attitudes toward his tasks. Not simply a post-high-school instructor of grades 13 and 14, he is, in his own desire and view, a colleague in a new kind of collegiate effort, as yet ill defined and in furious flux." [9]

Some of these matters are presently being explored, specifically with respect to junior college science and junior college science teachers, by the Commission on Science Education of the American Association for the Advancement of Science. A study, sponsored by the National Science Foundation, hopefully to be concluded before the end of 1967, has as its objectives: (1) "to determine the qualifications and teaching loads of junior college teachers in the natural and social sciences, engineering and technology; and [the gathering of] information about courses taught, so as to identify areas wherein improvement in teacher qualifications and teaching burden are needed," and (2) "to identify the status of science manpower in junior colleges, particularly with respect to origins and previous experiences, and commitment to remain in junior college teaching."

Plans call for a questionnaire circularization of a sample of junior college teachers in the following fields: agriculture, anthropology, the biological sciences, chemistry, the earth sciences, economics, engineering, mathematics, physics, political science, psychology, sociology, and technology.

A brief listing of the type of information which is to be collected will give some indication of the scope of the survey: vital statistics (age, marital status, etc.), income (salary and other), workload (in terms of students, classes, preparations, "moonlighting," etc.), nature of courses taught, experience (in teaching and related activities), academic attainment (degree level and area), present field of major interest and/or competence, participation in supplementary training activities (National Science Foundation institutes, etc.), accomplishments (in terms of awards, publications, etc.), membership in professional societies, commitment to teaching (in general, and specifically at the junior college level), etc.

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[9] American Council on Education, *Higher Education and National Affairs*, vol. XVI, No. 2 (Jan. 13, 1967).

In addition to information on teachers, a limited amount of information will be gathered on junior colleges as institutions—such as: the relationship, if any, of the junior college to a high school or a 4-year college; the designations of degrees and/or certificates awarded by the institution; the relative emphasis placed on the various tracks and sequences offered by the institution; etc.

Finally, the study will attempt to identify and incorporate in the analysis criteria and standards which might be judged appropriate for assessing the qualifications of science teachers of lower division students.

To return to the Garrison study, referred to above—it ends with the following "brief agenda of basic questions,"[10] all of which, at least by extension, are germane to the issue of junior college faculty:

> 1. In what ways is teaching in the junior college (particularly in the comprehensive, publicly supported, community college) significantly different from instruction at the freshman-sophomore level in 4-year colleges and universities? . . .
>
> 2. Is the organization of the college such that communication among groups (particularly board of trustees-administration-faculty-students) is swift, accurate, and flexible? . . .
>
> 3. Does the college have specific administrative provisions (especially budget allocations) to provide faculty adequately with the following?
>
> (*a*) Sabbatical leave, or special leave where indicated.
> (*b*) Grants-in-aid for advanced study or refresher work.
> (*c*) Travel and subsistence allowances for attendance at selected meetings or conferences.
> (*d*) Clerical and other assistance.
>
> 4. What is the nature and extent of in-service programs for faculty at the college? Are such programs planned and carried through by joint faculty-administration teams? Is budget provision made for outside consultants or instructors; for occasional released time of faculty members coordinating these programs? Are the in-service programs adequately buttressed with supporting personnel (secretarial, visual aids where appropriate, etc.)?
>
> 5. Does the college have any program of administrative internship, especially to develop from its own ranks those who would eventually have responsible positions as department or division heads?
>
> 6. Does the guidance staff of the college have close working relationships with faculty so that, in effect, mutual and continuing education is taking place; so that each group knows the functions and needs of the other?
>
> 7. How is teaching evaluated at the college? * * *
>
> 8. Does the college have the equivalent of an office of institutional research (perhaps only one person in a small college, several in larger ones), with the function, among others, of persistent inquiry and experiment with means and methods of instruction?
>
> 9. Does the college have adequate, clearly organized means of communications with the senior institutions to which its students transfer?
>
> 10. Since nearly two-thirds of all junior college students do not transfer, has the college a program of followup studies to provide knowledge of what, in fact, its students do—and how they do—after college?

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[10] Roger H. Garrison, *Junior College Faculty: Issues and Problems* (Washington, D.C.: American Association of Junior Colleges, 1967) pp. 87 ff.

Finally—it would seem that the central focus of an incremental national thrust in the area of junior college support programs should be the teacher. This is especially true if the orientation to the issue of the junior college is content centered (as contrasted with being student centered) and still more so if the content is categorical (and especially if it is "science").

The science teacher corps within the junior colleges is relatively small, and is relatively easily identified. That is to say, the target population, unlike other science-educable populations, is of manageable proportions. The impact of programs aimed at improving the quality of such a population would have a noticeable effect. Given the foreseeable and large increase in the demand for science education (mainly a function of increased retention, in turn a function of the continued spread of the "junior college movement"), it might be wise to give most serious consideration to enhancing the quality (if not the quantity) of a strong cadre of junior college science teachers.

TABLE I-1.—*Impact of science faculty training activities on colleges and universities by type of institution*

Type of institution[1]	Institutions							Individuals					
	Institutions in Universe [1]		Institutions affected, fiscal year 1965 [2]		Percent of (B) affected	Institutions affected, fiscal year 1964 and/or fiscal year 1965 [3]		Fiscal year 1965 science faculty fellows [4]		Fiscal year 1965 college participants [5]		Fiscal year 1965 total individuals [6]	
(A)	(B)		(C)		(D)	(E)		(F)		(G)		(H)	
	Number	*Percent*	*Number*	*Percent*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*	*Number*	*Percent*
University	156	7.3	143	10.6	91.7	149	9.7	129	40.3	882	19.5	1,011	20.9
Liberal arts college	792	36.8	606	45.1	76.5	695	45.3	111	34.7	1,868	41.3	1,979	40.8
Teachers college	188	8.7	147	10.9	78.2	163	10.6	28	8.8	569	12.6	597	12.3
Independent technical schools	58	2.7	44	3.3	75.9	48	3.1	30	9.4	224	4.9	254	5.2
Theological or religious schools	201	9.3	20	1.5	10.0	22	1.4	1	.3	30	.7	31	.6
Other independent professional schools	79	3.7	8	.6	10.1	14	.9	2	.6	12	.3	14	.3
Junior colleges	609	28.3	354	26.3	58.1	418	27.3	19	5.9	885	19.5	904	18.7
Technical institutes	12	.6	12	.9	100.0	12	.8			28	.6	28	.6
Semiprofessional schools	9	.4	9	.7	100.0	9	.6			27	.6	27	.6
Fine art schools	46	2.1	1	.1	2.2	3	.2			1	0	1	0
Subtotal	2,150	100	1,344	100	62.5	1,533	100	320	100	4,526	100	4,846	100
No data cases			19			65		2		27		29	
Total cases	2,150		1,363		63.4	1,598		322		4,553		4,875	

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[1] Source: U.S. Office of Education 1965 Opening Fall Enrollment in Higher Education. For purposes of statistical analysis, institutions of higher education are classified as 4-year or 2-year according to length of program. The 4-year institutions offer programs reaching a level of at least 4 years beyond high school. Both graduate and undergraduate institutions are included. The 4-year institutions are further classified into 7 major curricula organizational types:

Classified as universities are institutions which give considerable stress to graduate instruction, which confer advanced degrees as well as bachelor's degrees in a variety of liberal arts fields, and which have at least 2 professional schools that are not exclusively technological. Liberal arts colleges, as differentiated from universities, are institutions in which the principal emphasis is placed on a program of general undergraduate education.

The category of "independently organized professional schools" consists of institutions which offer professional education but which are not affiliated with universities. There are 5 groupings of institutions within this category: (a) Teachers colleges—devoted primarily to teacher education; (b) technological schools—providing education predominantly in technical and physical science disciplines; (c) theological and religious schools—in which the program offerings are wholly or principally in theology, religion, or religious education; (d) schools of art—specializing in painting, sculpture, design, drama, music, dance, etc.; and (e) other professional schools (not classified above)—offering programs directed toward one or more fields of specialization, such as medicine, law, business, pharmacy, optometry, etc.

[2] An institution having at least 1 faculty member participant in 1 or more of the programs listed in 4 and 5 below.

[3] Accumulated total of institutions having at least 1 faculty member participant in a fiscal year 1964 and/or fiscal year 1965 program.

[4] NSF fiscal year 1965 science faculty fellowship program.

[5] NSF fiscal year 1965 institutes, conference, and research participation for college teachers programs.

[6] Not included are 202 participants from foreign institutions and 90 cases wherein the participants did not submit sufficient information to permit identification of his home institution.

Source: National Science Foundation.

II. Current Situation

One of the most noticeable educational phenomena of the last decade or two is the proliferation of junior colleges across the American landscape. They have been growing so fast that statisticians are unable to keep pace with the growth; to talk in terms of a "current" situation becomes hazardous. With proliferation, they have also (Dr. Gleazer, executive secretary of the American Association of Junior Colleges, informs us) achieved a greater measure of respectability: "Just a few years ago junior colleges were just an afterthought. Now [they] are considered part of the family of higher education." [11]

This view is not, however, universally held. It brings to mind a query of "a group of critics who witnessed the birth of the [pop art] movement * * * : Is pop art a serious art form or is it a fraud? Is it a major trend in the mainstream of 20th-century art or is it a passing fad?" [12] Although hardly a fraud—and certainly not a passing fad—is the junior college in the mainstream of 20th-century education? Can it command the resources to contribute significantly to the national educational effort? "Many of the newer community colleges are little more than glorified high schools. With faculties recruited from secondary schools and from among the culls of the colleges, the level of instruction at some of these schools is low and the rate of learning still lower." [13]

Another critic is equally harsh, stating that the—

> leap from near invisibility to the limelight has been a precarious one, and it cannot be said that the community college movement has landed very squarely on its feet. It remains little understood by the community at large or by the community's better-educated members. Its functions are so diverse, its pupils so scattered, and its efforts to be all things to all students so determined that it escapes identification, and identity is one of the things it most wants. In general it has been looked down upon by holders of B.A. degrees as a refuge for the stupid, and it has been avoided as a place to teach by most serious scholars as having no academic status and offering no intellectual companionship. For the socially ambitious it is a limbo better not discussed. [14]

However one reacts to this educational development, there is little doubt that "this is where the action is." During the summer of 1965, the American Association of Junior Colleges identified about 200 new junior colleges in various stages of development. Fifty new colleges opened in the fall of 1965, and an additional 50 in the fall of 1966. The AAJC expects this rate of establishment of new junior colleges to continue through 1970, when publicly supported community junior colleges should number more than 1,000. The AAJC estimates that there are presently some 800 junior colleges enrolling about 1.25 million students. Some 500 are of the publicly supported community type, enrolling about 88 percent of the students.

Gleazer estimates that about $5 billion will be spent for buildings and facilities during the next 10 years, if colleges are established at the rate expected, at a cost of about $10 million per campus. He further estimates that 100,000 more teachers will be needed to man this educational expansion.[15]

California has been the leader in the community-college "movement." Gleazer estimates that American junior colleges would have an enrollment of 6.5 million by 1975 if all States followed California's lead. Ninety percent of the State's high schools are within a junior college district, the goal being 100 percent. With some 80 junior colleges within its borders already, California expects to establish about 10 more before the close of 1967. For a number of years now, more than 85 percent of lower division students in California have been enrolled in junior colleges.

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[11] Gerald Grant, "Junior College Rise Is Phenomenal," *The Washington Post* (Nov. 11, 1966), E-12, col. 3.

[12] Praeger, *Books That Matter*, Fall-Winter (catalog), p. 48.

[13] "Education—College, J.G.," *Newsweek* (Apr. 20, 1964), p. 108.

[14] Russell Lynes, "How Good Are the Junior Colleges?" *Harper's* (November 1966) pp. 59-60.

[15] National School Public Relations Association, *Washington Monitor*, (Mar. 31, 1966), p. 147.

The former president of the University of California, Clark Kerr, has helped abolish much of the requisite freshman and sophomore curricula at Berkeley, and has asked students to take their first 2 years at junior colleges, when possible. This development, among others, indicates to many Californians that a new board of trustees, similar to the University of California Board of Regents and the Board of Trustees of the California State Colleges, ought to be created to control all junior colleges in the State. Bills on the subject, however, died in the 1965 State legislature. Recently, Dr. Leland L. Medsker, professor of education at Berkeley, presented his study of the problem to the State Coordinating Council for Higher Education. The Council approved, through a committee, the new governing board—in principle—to "assume all powers, duties and responsibilities with respect to junior colleges now vested in the State Board of Education, the State Superintendent of Public Instruction, and the State Department of Education." [16]

Next to California, Florida has been most active in the so-called junior college movement. There are now junior colleges within "commuting" (variously defined in the several States) distance of 80 percent of the population in Florida. The figure will reach 95 percent when those institutions already authorized are established. The goal is 99 percent. Florida planned to build six new junior colleges in 1966.

New York State has made the community college a basic plank in its planning for higher education. Eight institutions are in the process of establishment. Eighty-five percent of the population resides within commuting distance of the existing 28 community colleges and six 2-year technical institutes. The State plans to spend $300 million on construction at 2-year colleges by 1970; by that year, annual expenditures for operating such institutions will total $126 million.

Illinois, which is credited with having established the first public junior college, has 19 institutions at various levels of completion. Only four of its 102 counties are not within an existing or proposed junior college district. New Jersey recently opened four county junior colleges; plans to open 10 more in the near future. Only four of the State's 21 counties have taken no official action on such institutions. Michigan has 24 junior colleges and is about to establish an additional 10. Pennsylvania plans a system of 30 public junior colleges. Four have opened in the last 2 years; 12 more are in various stages of planning.

The foregoing five States (Illinois, New York, New Jersey, Michigan, and Pennsylvania), plus California and Florida, have a population of some 80 million, or more than 40 percent of the Nation's total. The activities in these States are evidence of the fact that further advances in the universalization of higher education in the United States are rapidly taking place.

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[16] Education Commission of the States, *Compact, Review of Education* (November 1966), p. 3.

Many urban areas are developing multicampus junior college operations to insure ready accessibility to all citizens. Among such are Boston, Miami, Los Angeles, Minneapolis, St. Louis, Cleveland, Philadelphia, Birmingham, Pittsburgh, Dallas, Fort Worth, Seattle, Portland, Dayton, San Francisco, Spokane, and New York.

The Los Angeles system, by way of illustration, now enrolls 69,000 students, 29,000 day and 40,000 evening; will have 50,000 day students by 1970. Such growth will require an expenditure of $46 million for new construction.[17]

While most of the action is in the public sector, private and church-related junior colleges are also planning and building for the future. Representatives of such colleges, at a national meeting held in 1963, agreed that they could not compete with the public sector; that they had an important role to play; that they should concentrate on doing what they could do best (i.e., provide good teaching and counseling services to smaller but no-less-important numbers of students than the larger public junior colleges).[18]

The junior college (and particularly the dominant type, the community junior college) apparently is becoming the vehicle by means of which the country is accelerating the pursuit of its educational ideal—providing all youth an opportunity to obtain education and training to the limit of their capabilities.[19] The early college was a place for "resident" students. With the coming of extension, the college sent its professors to the students. With the community junior college, the college itself has come to the students.

III. Toward Universal College Education

More than ever before education is being subjected to the pressure of numbers—population growth and the spread of schooling—and the pressure exerted by the advance of technology. Education has become a mass problem in terms of the resources it absorbs and of the training demands it is required to meet. Along with its traditional task of developing personal abilities of individuals, it now, more than ever before, must insure adaptation to economic realities in the interest of both individuals and society.

Never before has a higher education seemed so important for social, academic, vocational success. The Nation's 4-year institutions are progressively having more and more difficulty in absorbing increasing enrollments. The result is that increasing numbers of high school graduates whose finances, grades, interests, inhibitions, or restricted ambitions do not make them material[20] for 4-year institutions are turning to the junior college. One critic defines this uniquely American institution as one which is "dedicated to the proposition that [every American] is entitled to a college education, or at least half of one."[21]

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[17] Much of the foregoing information was culled from the following three sources: (1) "Junior Colleges—Increase," *School and Society* (Nov. 12, 1966), pp. 380, 398; (2) Edmund J. Gleazer, Jr., "AAJC Approach—Toward Universal Higher Education," *Junior College Journal* (November 1966), p. 7; and (3) *Higher Education Act of 1956*, hearings before the Subcommittee on Education of the Committee on Labor and Public Welfare, U.S. Senate, 89th Cong., 1st sess., on S. 600, pp. 1137-1139, 1141.

[18] The American Association of Junior Colleges, *The Privately Supported Junior College: A Place and Purpose in Higher Education* (Washington, D.C.: AAJC, 1963).

[19] There is nothing approximating a definite national policy on this except in such general terms as "Every child is entitled to his birthright—education up to a youth's maximum ability." See Albert H. Booker, *Quality and Quantity in Higher Education*, (Presidential address; Chicago, Ill.: American Statistical Association, December 1964), pp. 1–2.

[20] Junior colleges are, of course, also absorbing an increasing number of students who are material for 4-year institutions.

[21] "Education—College, J. G.," *Newsweek* (Apr. 20, 1964), p. 108.

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It could not be determined whether this critic was alluding to the length or the quality of instruction.

Two years ago, the Educational Policies Commission called for the country to "raise its sights to make available at least 2 years of further education for all high school graduates." The President, the President's Committee on National Goals, the Secretary of Labor, the National Commission on Technology, Automation, and Economic Progress—all sound a similar note: "A nationwide system of free public education through 2 years beyond the high school should be established." [22] The general extension of schooling to approximately the age of 20, to a point where the 2-year degree of tomorrow becomes as prevalent as a high school diploma of today, is, of course, consistent both with American tradition and with the requirements of the new economy and technology. All things considered, significantly larger college enrollments, particularly at the "lower division" level, seem to be inevitable in the years ahead.

The numbers of individuals within relevant age groups continue to increase. (Table III–1, p. 27). The population 18 to 21 years of age will become fairly stabilized during the period 1968 to 1970 at about 14 million persons. During the decade of the 1970's there will be a resumption of the upward trend, the annual increments somewhat larger in the early years of the decade than in the later years. It is estimated that the population 18 to 21 years of age will total almost 17 million in 1980, about 25 percent more than at present.

The largest reservoir of potential college entrants is, of course, the high school graduating class. High school graduates began to number in excess of 1 million students in the 1930's, are in excess of 2 million in the present decade, and will approximate 3 million by the end of the decade (tables III–2 and III–3, p. 27). These numbers constitute an ever-increasing percentage of the population of the relevant age group. Illustratively, the high school graduates of 1909–10 constituted almost 9 percent of the population 17 years of age. By the middle of the present decade, this ratio had increased to more than three quarters. It cannot, of course, increase indefinitely. It does, nonetheless, represent a continuing and massive potential demand for higher education.

There has been a considerable improvement in persistence in school attendance at all levels (table III–4, p. 28). In the early 1930's, fewer than 12 percent of the pupils who had been in the fifth grade 8 years earlier entered college. By 1965, the ratio had increased to almost 40 percent.

Inherent in the foregoing figures is an increase specifically in high school-to-college retention from just under 40 percent to over 50 percent.[23] The differences among the various States, however, are considerable, ranging (in the fall of 1963) from a low of 31 percent in Maine to a high of 81 percent in California (table III–5, p. 29). [24] Again, inherent in this difference is a dormant potential demand for higher education, particularly at the lower division level.

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[22] In Edmund J. Gleazer, Jr., "AAJC Approach—Toward Universal Higher Education," *Junior College Journal* (November 1966), p. 7.

[23] I.e., the ratio of 118 college entrants to 310 high school graduates in 1933 (38.1 percent); and the ratio of 378 college entrants to 710 high school graduates in 1965 (53.2 percent). See table III–4, p. 28.

[24] These data must be used with great caution as they can be highly misleading. In one instance, a high percentage figure may reflect the extent to which a large program of publicly supported higher education within a State is attractive both to in-State and to out-of-State students; in another case, the extent to which the residents of a State not having a large program of publicly supported higher education have succeeded in matriculating in a State that does.

An analysis of Census Bureau data on enrollments by single years of age gives a further indication of the magnitude of the quiescent demand (table III–6, p. 29). In 1960, more than three-quarters of the population 17 years of age was enrolled in school; and about one-half, one-third, and one-quarter, respectively, of the population 18, 19, and 20 years of age. Most of the incremental lower division enrollments would presumably come from these latter age groups. With future population cohorts at these age levels numbering between 3 million and 4 million individuals, even modest increases in educational attainment would involve and be preceded by enormous increases in enrollments.

The way in which parents view the chances of college attendance on the part of their children provides some clue to the extent potential demand could become effective demand. A recent Louis Harris survey showed that, in spite of an admission of financial worries on the part of almost half of the parents queried, only 9 percent stated that their children would "probably not go" to college. Thirty-nine and 44 percent, respectively, stated that their children "certainly" or "probably" would go to college. Eight percent were "not sure" (table III–7, p. 30). There can be little doubt of a large existing potential for incremental college enrollments in terms of the existence of reservoirs of possible students. Perhaps more to the point is the following discussion of "college potential" in terms of some measure of ability of the individuals within relevant populations.[29]

An estimate of the distribution of various levels of "college potential"—in terms of "intelligence" specifically—can be derived from the norms for general intelligence developed in connection with the General Test Battery used by the U.S. Employment Service. On the basis of such norms, 50 percent of the population have the capacity to complete 2 years of junior college; about 31 percent, the capacity to complete a 4-year college course; and 16 percent, the capacity for attaining an advanced degree (table III–8, p. 30).[30]

A comparison of estimates of college potential with those of college attainment provides an indication of the extent to which the national educational ideal has not been achieved. For both sexes, combined 50.0 percent had the capacity required for success in junior college, but only 23.0 percent had completed at least 1 year of college (or about 55.0 percent of the men and 38.0 percent of the women having the requisite capacity).

Although the relative loss of college potential is greatest at the higher educational levels, the greatest absolute loss is represented by individuals with college-level capacity who fail to complete a single year of college (table III–9, p. 31). Among individuals in the 25–29 year age groups in 1960, there were 2.9 million who were capable of completing a junior college education, but who had not completed 1 year of college. Included in this figure are more than one-quarter of all the individuals (more than two-tenths of the males, and more than three-tenths of the females) "with the required level of intelligence." In terms of annual losses, this amounts to about 600,000 individuals—about 250,000 males and 350,000 females. Estimates of present "losses" would be larger because of the larger age cohorts involved.

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[29] Much of this discussion is based on Patrick Moynihan, "The Impact on Manpower Development and Employment of Youth," *Universal Higher Education* (ed.; New York, McGraw-Hill Book Co., 1966).

[30] Inherent in this statement is the assumption that the academic requirements for the several stages of educational attainment do not change.

The so-called losses of today may become, to a considerable extent, increments to junior college enrollments tomorrow. In terms of ability levels, the source of these increments will be an academically less able group. Fewer than 17.0 percent of the high school graduates who did not enter college (within 1 year of graduation) are in the top 30.0 percent of academic aptitude. In contrast, almost 60.0 percent of graduates who now matriculate are in this group (table III–10, p. 31).

The net effect of a more general adoption of the junior college as a vehicle for the "open door" to educational opportunity and of a more restrictive admissions policy by the 4-year institution—will be an increase, quantitatively and qualitatively,[27] of students seeking admission to junior colleges. The added responsibility (and concomitant challenges and problems) facing the junior college will consist of providing a still more comprehensive program to a yet wider range of student abilities and motivations.

The junior college, and particularly the more prevalent community-junior college, has always given recognition to the educational and vocational needs of the community; but of a community within a smaller geographical compass than the one with which the 4-year institution has been concerned. The strong emphasis on "service" to the community of the junior college sector of American higher education should be no cause for surprise: The "junior" partner in the American educational enterprise has merely assumed a responsibility for performing a service for the *local* community, while the "senior" partner continues to maintain a strong tradition of service to the American community *in general*.

The junior college emerges out of a growing need for institutions which offer a pattern of diversified education within a State, but which, on balance, have as their primary concern and interest the specific needs of the *local* community—in a modern age. The program reflects these needs and, reduced to essentials, consists of two parts—the vocational, broadly defined, and the academic. This duality of orientation—the "cosmopolitanism" of the traditional academic disciplines and the "provincialism" of the vocational—is nowhere else as apparent as in the junior college sector of American education.

The dual function of "training" and of "educating" a massive segment of the American population is, then, increasingly becoming the responsibility of the junior college sector of American higher education. The near future may witness the assumption by this sector of the preponderant responsibility for the first 2 years of postsecondary education and training; the more distant future, for, perhaps, essentially overall responsibility.

Such an eventuality would require that the junior college accommodate itself to a much larger and much broader task. Increasingly, the junior college student—be he a terminal student, or one that is baccalaureate motivated; and if the latter, be he an aspiring scientist or a humanist—must need be exposed to an increasingly more sophisticated science.

The question at issue is whether the junior college sector will be able to command the resources—in terms of staff and facilities, but particularly of staff—adequately to discharge its responsibilities to the American public.

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[27] That is, if enrollment increments from lower ability levels are more than offset by enrollment increments from higher ability levels (as the junior college increasingly takes over from the 4-year institution the function of educating lower division students).

TABLE III-1.—*General estimates and projections of population 18 to 21 years of age: 1960–80*

[In millions]

Estimates:		Projections—Continued	
1960	9.5	1970	14.3
1961	10.2	1971	14.6
1962	10.7	1972	15.0
1963	11.1	1973	15.4
Projections:		1974	15.7
1964	11.3	1975	16.0
1965	12.1	1976	16.3
1966	12.8	1977	16.4
1967	13.5	1978	16.5
1968	14.3	1979	16.7
1969	14.1	1980	16.8

Source: Bureau of the Census, "Projections of the Population of the United States, By Age and Sex: 1964-85," *Current Population Reports—Population Estimates* (Series P-25, No. 286, July 1964).

TABLE III-2.—*Number of high school graduates compared with population 17 years of age: United States, 1869–70 to 1964–65*

School year	Population 17 years old [1]	High school graduates [2]			Number graduated per 100 persons 17 years of age
		Total	Boys	Girls	
1869-70	815,000	16,000	7,064	8,936	2.0
1879-80	946,026	23,634	10,605	13,029	2.5
1889-90	1,259,177	43,731	18,549	25,182	3.5
1899-1900	1,489,146	94,883	38,075	56,808	6.4
1909-10	1,786,240	156,429	63,676	92,753	8.8
1919-20	1,855,173	311,266	123,684	187,582	16.8
1929-30	2,295,822	666,904	300,376	366,528	29.0
1939-40	2,403,074	1,221,475	578,718	642,757	50.8
1949-50	2,034,450	1,199,700	570,700	629,000	59.0
1951-52	2,040,800	1,196,500	569,200	627,300	58.6
1953-54	2,128,600	1,276,100	612,500	663,600	60.0
1955-56	2,270,000	1,414,800	679,500	735,300	62.3
1957-58	2,324,000	1,505,900	725,500	780,400	64.8
1959-60	2,862,005	1,864,000	898,000	966,000	65.1
1961-62	2,768,000	1,925,000	941,000	984,000	69.5
1963-64	3,001,000	2,290,000	1,121,000	1,169,000	76.3
1964-65 [3]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[1] Data from the Bureau of the Census.

[2] Includes graduates of public and nonpublic schools.

[3] Preliminary data.

NOTE.—Beginning in 1959-60, includes Alaska and Hawaii.

Source: U.S. Department of Health, Education, and Welfare, Office of Education, "Digest of Educational Statistics."

TABLE III-3.—*High school graduates in the United States, estimates and projections: 1954–55 to 1975–76*

[In millions]

Actual:		Projections:	
1954-55	1.35	1965-66	2.61
1955-56	1.42	1966-67	2.63
1956-57	1.45	1967-68	2.69
1957-58	1.51	1968-69	2.71
1958-59	1.64	1969-70	2.97
1959-60	1.86	1970-71	3.01
1960-61	1.97	1971-72	3.10
1961-62	1.93	1972-73	3.17
1962-63	1.95	1973-74	3.25
1963-64	2.30	1974-75	3.32
1964-65	2.64	1975-76	3.36

Source: U.S.O.E., *Projections of Educational Statistics to 1975-76* (in process).

TABLE III–4.—*Estimated retention rates, 5th grade through college entrance, in public and nonpublic schools: United States, 1924–32 to 1957–65*

School year in which pupils entered 5th grade	For every 1,000 pupils entering 5th grade in a specified year, this number— Entered 6th grade 1 year later	Entered 7th grade 2 years later	Entered 8th grade 3 years later	Entered 9th grade 4 years later	Entered 10th grade 5 years later
1924–25	911	798	741	612	470
1926–27	919	824	754	677	552
1928–29	939	847	805	736	624
1930–31	943	872	824	770	652
1932–33	935	889	831	786	664
1934–35	953	892	842	803	711
1936–37	954	895	849	839	704
1938–39	955	908	853	796	655
1940–41	968	910	836	781	697
1942–43	954	909	847	807	713
1944–45	952	929	858	848	748
1946–47	954	945	919	872	775
1948–49	984	956	929	863	795
1950–51	981	968	921	886	809
1952–53	974	965	936	904	835
1954–55	980	979	948	915	855
1956–57	985	984	948	930	871
1957–58	994	985	954	937	878

School year in which pupils entered 5th grade	Entered 11th grade 6 years later	Entered 12th grade 7 years later	Graduated from high school 7 years later (i.e., in the year shown)	Entered college 8 years later
1924–25	384	344	302 (in 1932)	118
1926–27	453	400	333 (in 1934)	129
1928–29	498	432	378 (in 1936)	137
1930–31	529	463	417 (in 1938)	148
1932–33	570	510	455 (in 1940)	160
1934–35	610	512	467 (in 1942)	129
1936–37	554	425	393 (in 1944)	121
1938–39	532	444	419 (in 1946)	(1)
1940–41	566	507	481 (in 1948)	(1)
1942–43	604	539	505 (in 1950)	205
1944–45	650	549	522 (in 1952)	234
1946–47	641	583	553 (in 1954)	283
1948–49	706	619	581 (in 1956)	301
1950–51	709	632	582 (in 1958)	308
1952–53	746	667	621 (in 1960)	328
1954–55	759	684	642 (in 1962)	343
1956–57	790	728	667 (in 1964)	357
1957–58	810	730	710 (in 1965)	378

[1] Lack of detailed information about students who were veterans prevents reliable calculation.

Source: U.S. Department of Health, Education, and Welfare, Office of Education, "Digest of Educational Statistics."

TABLE III-5.—*College entrance to high school graduation ratios, by States*

	Ratio of college registrants, fall 1963,[1] to high school graduates, 1962-63
Aggregate, United States	0.51
The 50 States and the District of Columbia	.51
Alabama	.32
Alaska	.47
Arizona	.61
Arkansas	.47
California	.81
Colorado	.55
Connecticut	.58
Delaware	.45
District of Columbia	.60
Florida	.62
Georgia	.39
Hawaii	.49
Idaho	.62
Illinois	.62
Indiana	.44
Iowa	.48
Kansas	54
Kentucky	.47
Louisiana	.47
Maine	.31
Maryland	.52
Massachusetts	53
Michigan	.44
Minnesota	.46
Mississippi	.52
Missouri	0.49
Montana	.58
Nebraska	.54
Nevada	.70
New Hampshire	.38
New Jersey	.53
New Mexico	.49
New York	.47
North Carolina	.36
North Dakota	.50
Ohio	.44
Oklahoma	.54
Oregon	54
Pennsylvania	.38
Rhode Island	.45
South Carolina	.34
South Dakota	.51
Tennessee	.42
Texas	.57
Utah	.56
Vermont	.34
Virginia	.47
Washington	.57
West Virginia	.37
Wisconsin	.43
Wyoming	.63
Outlying parts of the United States	.44

[1] For each State: Number of first-time college registrants in the United States giving that State as the State of their permanent residence, divided by the number of students graduating from that State's high schools.

Source: U.S.O.E., *Residence and Migration of College Students, Fall 1963*, table 7 (unpublished data).

TABLE III-6.—*Percent of population enrolled in school, by age and by sex: United States, 1960*

Age	Total	Male	Female	Age	Total	Male	Female
Total, 5 to 34 years	53.1	55.3	51.0	15 years	92.9	93.1	92.7
				16 years	86.3	86.6	86.1
5 years	44.9	44.8	45.1	17 years	75.6	76.3	74.9
6 years	83.3	83.0	83.5	18 years	50.6	54.6	46.6
7 years	97.0	96.9	97.1	19 years	32.7	37.3	28.4
8 years	97.8	97.8	97.9	20 years	23.5	27.9	19.3
9 years	98.0	97.9	98.0	21 years	18.7	23.6	13.9
10 years	97.9	97.8	97.9	22 years	12.5	17.9	7.2
11 years	97.8	97.7	97.8	23 years	9.7	14.7	4.8
12 years	97.5	97.4	97.6	24 years	8.3	12.9	4.0
13 years	97.0	96.9	97.0	25 to 29 years	6.1	.2	3.1
14 years	95.3	95.4	95.3	30 to 34 years	3.2	4.0	2.4

Source: *U.S. Census of Population, 1960, U.S. Summary, Detailed Characteristics*, PC(1), 1D, Washington: U.S. Bureau of the Census, p. 1-369 (table 165).

Table III–7.—*Distribution of parents' replies to question of "toughest problem" involved in college matriculation of their children*

	Percent
Financial worries	48
Good enough high school grades	32
Incentive, motivation to go	9
Enough room in colleges	3
Proper training	2
Learning to study	1
Getting into college of choice	1
Maintaining health	1
Not sure	1

PARENTS' EXPECTATION THAT CHILDREN WILL GO TO COLLEGE

[In percent]

	Certainly will go	Probably will go	Probably not go	Not sure
All parents	39	44	9	8
By income:				
Under $5,000	25	40	21	14
$5,000 to $9,999	31	51	9	9
$10,000 and over	63	31	4	2
By parent education:				
8th grade or less	24	36	28	12
High school	34	46	10	10
College	54	42	3	3
By region:				
East	35	43	12	10
Midwest	31	51	11	7
South	49	36	9	6
West	50	39	3	8
By size of place:				
Cities	40	40	12	8
Suburbs	36	43	10	11
Towns	45	42	9	4
Rural	34	50	8	8

Source: Louis Harris, "The Harris Survey—Money Is Root of College Try," *The Washington Post*, Mar. 23, 1965.

Table III–8.—*Relationships between college potential (persons with the required mental ability) and actual educational attainment, at 3 levels of college*

Level of education	G score (level of intelligence) required [1]	Percent of population		Actual (col. 3) as percent of potential (col. 2)
		With required level of intelligence [1]	Who have completed at least specified amount of college [2]	
Total population, all levels		100.0	100.0	
Junior college:				
Total	100	50.0	[3] 23.1	46.2
Male	100	50.0	[3] 27.4	54.8
Female	100	50.0	[3] 18.9	37.8
4-year college:				
Total	110	31.0	11.0	35.5
Male	110	31.0	14.4	46.5
Female	110	31.0	7.8	25.2
Postgraduate college:				
Total	120	16.0	3.8	23.7
Male	120	16.0	6.0	37.5
Female	120	16.0	1.6	10.0

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[1] U.S. Department of Labor, Bureau of Employment Security, *Guide to the Use of General Aptitude Test Battery*, sec. II—norms, October, 1962.

[2] U.S. Bureau of the Census, *Census of Population: 1960, Final Report PC(2)–5B*.

[3] Data refer to persons who completed 1 to 3 years of college.

Source: Patrick Moynihan, "The Impact on Manpower Development and Employment of Youth," *Universal Higher Education* (ed.; New York, McGraw-Hill Book Co., 1966).

TABLE III-9.—*Approximate number of persons with college potential at varies levels, number with unused potential, and annual loss of college potential*

[Based on data for persons from 25 to 29 years of age, 1960 census]

Level of education and sex	Number of persons (thousands)				
	With required level of intelligence [1]	Who completed at least specified amount of college [2]	Who failed to complete specified amount of college		
			Total age 25-29 in 1960	Percent of age group	Annua equivalent
Junior college:					
Male		[3] 1,462	1,297	22.6	40
Female		[3] 1,049	1,722	30.1	45
Total	5,457	[3] 2,511	3,036	26.9	[illegible]
4-year college:					
Male		771	880	16.0	[illegible]
Female		490	1,384	28.2	[illegible]
Total	3,374	1,261	2,175	20.6	[illegible]
Postgraduate college:					
Male		329	530	10.0	[illegible]
Female		86	797	14.4	[illegible]
Total	1,739	412	1,327	12.3	[illegible]

[1] U.S. Department of Labor, Bureau of Employment Security, Guide to the Use of General Aptitude Test Battery, Section II—Norms, October 1962.
[2] U.S. Bureau of the Census, Census of Population, 1960, Final Report PC(2)-5B.
[3] Data refer to persons who completed 1 to 3 years of college.

Source: Patrick Moynihan, "The Impact on Manpower Development and Employment of Youth" *Universal Higher Education* (ed.) New York, McGraw-Hill Book Co., 1966.

TABLE III-10.—*Distribution by academic aptitude of 1960 high school graduates who entered college and of those who did not*

Percentile rank on general academic aptitude test (Project Talent)	Graduates who entered college within 1 year	Graduates who did not enter college (potential new college students)		
		Total	Male	Female
Total:				
Number	613,[illegible]	490,480	127,[illegible]	146,720
Percent	100.0	100.0	100.0	100.0
90 to 99	23.2	3.7	3.1	3.4
80 to 89	19.1	5.7	5.7	5.7
70 to 79	15.4	8.2	7.8	8.4
60 to 69	11.6	10.0	9.6	10.1
50 to 59	9.4	11.7	10.9	12.3
40 to 49	7.3	13.1	13.1	12.8
30 to 39	6.3	13.2	13.1	13.0
20 to 29	4.9	12.8	12.8	12.3
10 to 19	2.4	12.2	13.2	12.6
0 to 9	1.9	11.2	14.2	8.3

Sources: Adapted from Project Talent, data on 1960 high school graduates responding to the 1961 followup questionnaire.
Patrick Moynihan, "The Impact on Manpower Development and Employment of Youth," *Universal Higher Education* (ed.) New York, McGraw-Hill Book Co., 1966.

IV. A MODEL LAW FOR JUNIOR COLLEGES AND THE LAND GRANT COLLEGE PHENOMENON

The increasing concern of the States with education and training at the junior college level is evidenced by the many studies which have been made within the last few years. An analysis of 38 such studies in 22 States resulted in the following conclusions concerning the role, the establishment, and the development of junior colleges:

> * * * (1) increasingly the States are making studies of their programs of higher education with a view toward studying and improving their effectiveness; (2) the identification of junior colleges as a positive approach to meeting rapidly growing demands for postsecondary education has brought greater attention to these institutions in State studies; (3) the problems of higher education, along with social, political, economic, technological, and scientific forces, are operating to define and determine the role of junior colleges and their relationship to higher education; (4) increasingly junior colleges are being recognized as institutions which can make a valuable contribution to higher education through their variety of programs which are urgently needed in the various States; (5) public demand for services provided by postsecondary institutions will continue to mount creating greater need for coordination of junior colleges with senior institutions; (6) strengthening of the central agency for statewide supervision and coordination of junior colleges in the individual States will better enable the States to cope with the accelerated development of these institutions so they will be able to meet current and future demands for their services; (7) a well-defined State policy of public higher education, in which each different type of institution has a differentiated role defined for it would help junior colleges solve their problem of indeterminate status and better interpret their role to others; (8) a very real need exists for a common understanding by those concerned with the further development of junior colleges in the individual States; (9) there can be no one valid set of criteria for the establishment of all new junior colleges; (10) studies of criteria for the establishment of junior colleges should be related to those for senior institutions since both need to be established and maintained on the basis of clearly defined objectives because the interrelatedness but yet distinctiveness of 2-year and 4-year institutions should be recognized and preserved; (11) State laws for the establishment of junior colleges should be phrased in broad, permissive terms and specific criteria should be regulatory and left to the State-level approval agency responsible for their establishment and development; and (12) additional studies are needed to establish guidelines for securing information needed to determine whether or not a specific type of institution should be established in a State.[18]

The existence of many studies to the contrary notwithstanding, most States still authorize the construction and establishment of junior colleges and appropriate funds for the support of such institutions on an ad hoc basis. There is no highly developed body of law applicable to junior colleges as there is to long-established State university systems. In the absence of such, the Council of State Governments[19] has suggested legislation designed as a comprehensive State act on junior colleges.

The contents of the 14 sections of this "model law" draw upon the results of a multitude of studies and may be indicative of the important elements relating to the role, the establishment, and the development of junior colleges. These sections treat, in order, with definitions, the State plan, the preparatory study, approval of the plan, the composition of the board of control, the duties and powers of the board, a public retirement system, finances, the cooperation of various State jurisdictions in the establishment and maintenance of junior colleges, the transfer of property, junior college districts, nonresident students, the limitation on the proliferation of facilities, and, finally, the effective date.

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[18] Earle Dee [illegible], *Current Planning for the Development of Public Junior Colleges in the United States*, (Abstract of unpublished dissertation; University of Colorado, [illegible]). See also *Junior Colleges: 20 States* (Washington, D.C.: A.A.J.C., [illegible]).

[19] The Council of State Governments, "Community Junior College Act," *Suggested State Legislation* (vol. XXIV, [illegible]).

Of particular relevance to those concerned with categorical (science) education in the junior college sector is the definition of the "community junior college" in "Section 1. Definitions. (a)" and the suggested items of need and feasibility which are recommended for study in "Section 3. Preparatory study. (a)."

The community junior college is defined as—

> an educational institution established or to be established by one or more cities, counties, or other subdivisions of this State, and offering specialized or comprehensive programs of instruction generally extending not more than 2 years beyond the high school level, which may include but need not be limited to courses in technological and occupational fields or courses in the liberal arts and sciences, whether or not for college transfer credit.

The factors to be studied are—

> (1) The extent and geographic boundaries of the area most appropriate as the service area for the community junior college.
> (2) The present concentration of population and population trends and projections within the intended service area.
> (3) Total school enrollment in grades 1 through 12 and in grades 9 through 12 in the service area.
> (4) The number of high school graduates in the service area, and a classification of them by their post-high school educational experience.
> (5) Types and capacities of educational facilities beyond the high school level present in the service area or within [50] miles of the center of such area.
> (6) Educational services needed within the service area.
> (7) Ability of the service area to contribute to the financial support of a community junior college.
> (8) Such other data as the [State community junior college authority] may by rule or regulation require.

The orientation of the individuals concerned with the junior college movement, as reflected in the contents of the model law and specifically *the two excerpts quoted immediately above*, would seem to be student directed rather than curriculum directed. The objective is to provide whatever programs are thought to be needed within commuting distance of all potential students. The realization of the American educational ideal of providing, for all citizens, educational opportunity "extending not more than 2 years beyond the high school level" awaits adoption and effectuation by all States of such provisions as are contained in the model law.

One is reminded of the provisions of "an act donating public lands to the several States and territories which may provide colleges for the benefit of agriculture and the mechanic arts (Morrill Act) 7 U.S.C. S. 301–305, 307, 308 (1862)," which provided for the following:

> *Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,* That there be granted to the several States, for the purposes hereinafter mentioned, an amount of public land, to be apportioned to each State a quantity equal to thirty thousand acres for each senator and representative in Congress to which the States are respectively entitled by the apportionment under the census of eighteen hundred and sixty * * * (and that) all moneys derived from the sale of the lands aforesaid by the States * * * (shall be devoted) to the endowment, support, and maintenance of at least one college where the leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life * * *[8]

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[8] Quoted in *The State Universities of New England* (Storrs: The University of Connecticut, August 1960).

There are similarities of language in the Morrill Act and the model law which are worthy of note. In terms of programs, the land grant institution was "without excluding other scientific and classical studies * * * to teach such branches of learning as are related to agriculture and the mechanic arts." The suggested model law would have the junior college offer "specialized and comprehensive programs * * * which may include but need not be limited to courses in technological and occupational fields or courses in the liberal arts and sciences, whether or not for college transfer credit." The land grant colleges were "to promote the liberal and practical education of the industrial classes * * *". The intent of the model law is to provide an opportunity for a liberal and practical education for all citizens within commuting distance of their homes.

The word "college" was used very loosely in the middle of the last century. It was not clear whether in the Morrill Act Congress had intended to create trade schools at essentially a high school level or genuine institutions of higher education in science and technology.[31] Many of the then existing institutions of higher education subsequently became land grant institutions. On the other hand, the forerunner of Pennsylvania State College was the Farmer's High School, founded a few years before the passage of the original land grant college legislation. Similarly, with repsect to existing and planned junior colleges, some undoubtedly will be inadequate extensions of high schools, others will be adequate "junior" partners to 4-year institutions.

The question may appropriately be asked: To what extent is the future of the junior college movement mirrored in the land grant college phenomenon of the past?

In retrospect, the land grant phenomenon—

> forced education to fit the changing social and economic patterns of an expanding nation. It helped to create equality of educational opportunity by offering education at public expense to the industrial classes; it gave some measure of dignity to the vocations pursued by such classes. It placed science in relation to everyday work.[32]

The country responded to the new philosophy supporting the land-grant idea. Growing self-confidence helped each institution to reconsider its function. Illustratively: the University of Wyoming, soon after its founding, could report that it "has at length been recognized as something more than a local school. People feel it belongs to all Wyoming."[33] Incidentally, a conclusion was soon reached that the land-grant colleges must not limit themselves merely to the role of training men and women at the collegiate level. The curriculum saw concomitant changes. The land-grant college had been among the first to concentrate on the technical. With the passage of time and the increasing complexity of technology, a somewhat middle course was to be taken in terms of programs. The colleges were to be concerned, on balance, with a continuum which ranged from the intellectual elite to the practical farmers and tradesmen.

Born out of America's commitment to education, higher education came to be regarded not so much a luxury as a national necessity.

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[31] Alice M. Rivlin, *The Role of the Federal Government in Financing Higher Education* (Washington, D.C.: The Brookings Institution, 1961), p. 77.

[32] Edward Danforth Eddy, Jr., *Colleges for Our Land and Time, The Land-Grant Idea in American Education* (New York: Harper & Bros., [illegible]), p. [illegible].

[33] Edward D. Eddy, Jr., *Colleges for Our Land and Time*, p. 113 (quoting Colonel Downey at the time of his resignation from the Wyoming Board).

With the advent of the land-grant phenomenon, America seemed to have accepted the philosophy that each individual, regardless of economic or social status, should be provided the opportunity to develop his innate abilities to the ultimate benefit of self and society.

The result has been the presence, in the land-grant institutions particularly, but throughout higher education generally, of a—

> cross-section of American life. The institutions have become an academic melting pot of all classes and kinds. With higher education of qualified youth now deemed a national necessity, college education is regarded no longer as a privilege but as a right. As rights are guaranteed by the State, so college education should be at public expense if not otherwise available. To meet the demand, the colleges opened their doors to an increasing number of American youth to whom they would furnish subjects for study to suit the needs and tastes of each generation of a changing nation.[34]

The land-grant phenomenon has applied to higher education what—

> Morrill has called the challenge of useful relevance. The land-grant colleges have developed from institutions which were little more than trade schools. In this development, what was originally vocational education with emphasis on occupations has become professional education with the goal of broad training to fit a number of life careers. The colleges are not preparing plumbers and mechanics but engineers; not cooks and seamstresses but home economists; not so much practical farmers on the land as agricultural scientists. To do this, they have attempted to stress the fundamental disciplines above the practical techniques, the sustained pursuit of scholarship above the vocational art, and social consciousness above the narrow concern for employment and self-preservation. To them, social progress depends upon the highest degree of professional training.[35]

The development of the colleges was reflected in the activities of their national association; and even in the changes in name. From its organization in 1887 until 1919 it was known as the Association of American Agricultural Colleges & Experiment Stations. From 1919 until 1925 it bore the name of Association of Land-Grant Colleges. In 1926 "and Universities" was added. It was not changed again until 1955, when it became officially the American Association of Land-Grant Colleges & State Universities.

The land-grant institutions now constitute a most significant sector of higher education (table IV–1, p. 36). Illustratively: in 1963–64 they employed almost 140,000 professional staff members (about 35.9[36] percent of the total for higher education); enrolled about three-quarters of a million (17.4 percent) degree-credit students; and granted more than 100,000 (19 percent) bachelor's and first-professional degrees and about 6,000 (33.9 percent) doctorates.[37]

There are, of course, many and obvious differences between the so-called junior college movement and the land-grant phenomenon. But the similarities are worthy of note. In terms of social pressures in general, in terms of the existence of educable populations, in terms of the existence of a dynamic association spearheading the movement—we have the ingredients for an advance in the democratization of higher education at the lower division level of the proportions and significance of the land-grant phenomenon.

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[34] Edward D. Eddy, Jr., *Colleges for Our Time*, pp. [illegible].

[35] Edward D. Eddy, Jr., *Colleges for Our Time*, p. [illegible].

[36] For the sake of uniformity throughout the text, the convention has been adopted of expressing percentages to one decimal point—even when such percentages are relatively imprecise estimates or projections.

[37] Percentages derived from data contained in table IV–1, and various tables in Kenneth A. Simon and W. Vance Grant, *Digest of Educational Statistics* (Washington, D.C.: U.S. Government Printing Office, 1965).

TABLE IV–1.—*Selected data for land-grant institutions on faculty, students, degrees, and finances: United States and outlying areas, 1953–54 and 1963–64*

Item (1)	1953–54 (2)	1963–64 [1] (3)
FACULTY AND OTHER PROFESSIONAL STAFF		
Total number of positions	[illegible]	[illegible]
Total number of different persons	[illegible]	[illegible]
RESIDENT DEGREE-CREDIT ENROLLMENT		
Total	[illegible]	[illegible]
Undergraduate	[2] [illegible]	[illegible]
1st professional	(3)	[illegible]
Graduate	[illegible]	[illegible]
EARNED DEGREES CONFERRED		
All 4-year degrees	(4)	[illegible]
Men	(4)	[illegible]
Women	(4)	[illegible]
1st-professional requiring 5 or more years	(4)	[illegible]
Men	(4)	[illegible]
Women	(4)	[illegible]
Bachelor's and 1st professional	[illegible]	[illegible]
Men	[illegible]	[illegible]
Women	[illegible]	[illegible]
Master's	[illegible]	[illegible]
Men	[illegible]	[illegible]
Women	[illegible]	[illegible]
Doctor's	[illegible]	[illegible]
Men	[illegible]	[illegible]
Women	[illegible]	[illegible]
REGULAR FEDERAL APPROPRIATIONS		
Total	[illegible]	[illegible]
Funds for instruction and facilities (Morrill-Nelson and Bankhead-Jones funds)	[illegible]	[illegible]
Funds for research (experiment stations)	[illegible]	[illegible]
Hatch funds as amended	[illegible]	[illegible]
Research under Agricultural Marketing Act	[illegible]	[illegible]
Funds for cooperative extension	[illegible]	[illegible]
Smith-Lever funds (act of 1914 as amended)	[illegible]	[illegible]
Extension under Agricultural Marketing Act	[illegible]	[illegible]
ENDOWMENT INCOME UNDER LAND-GRANT FUNDS		
Total	[illegible]	[illegible]
From 1862 land-grant funds	[illegible]	[illegible]
From other Federal land-grant funds	[illegible]	[illegible]

[1] Data on faculty and enrollment are for the 1st term of the academic year.
[2] Includes 1st professional.
[3] Data not available, included with undergraduates.
[4] Data not available.

Source: U.S. Department of Health, Education, and Welfare, Office of Education, "Statistics of Land-Grant Colleges and Universities, Year Ended June 30, [illegible]"; and unpublished data.

V. A Universe of Junior Colleges

One of the most striking characteristics of institutions of higher education in the United States is their hardly believable diversity. Nowhere is this diversity as apparent as in the junior college sector. There are critics who consider the institution neither high school nor college, but a hybrid, an American educational mutation.

In this general connection, Gleazer of the AAJC is highly critical of the junior college statistics which the U.S. Office of Education publishes, stating that they contribute to the problems these institutions face in trying to find their proper niche in the American educational structure. "We face a whole set of old definitions over there. When [USOE officials] ask me whether we should be considered higher education or secondary education, I ask them, 'Am I the son of my father or my mother?' " He goes on to assert that "the junior college is an entirely new organization and can be described only in terms taking this into account."[38]

The inadequacy, apparent or real, of U.S. Office of Education statistics is more a reflection of the difficulty inherent in defining the junior college universe than of the inherent quality of the data. In any event, they provide one basis for defining the junior college universe of institutions. Figure V-1 (p. 40) presents the structure of higher education in the United States schematically. The structure, to quote a popular refrain, "is busting out all over," and reflects the attempt of higher education to accommodate to the needs of the modern age. The junior college sector is a significant element in this accommodation.

The number of institutions included in a junior college universe depends on the definition used. The U.S.O.E. lists in its *Education Directory, 1965–66*—Part 3: Higher Education[39] 644 institutions of higher education which offered "2 but fewer than 4 years of work beyond the 12th grade" (code I in tables V–1 to V–3, pp. 41–43). The criteria for listing in the directory are as follows:

> 1. Institutions accredited or approved by a nationally recognized agency, by a State department of education, or by a State university are eligible for inclusion.
> 2. Institutions not meeting requirements of criterion 1 are eligible for inclusion if their credits have been and are accepted as if coming from an accredited institution by not fewer than three accredited institutions.[40]

These 664 institutions constituted 30 percent of the 2,207 higher educational institutions listed. Eighty-two percent (545) were coeducational, 6 percent (40) were for men only and twice as many (79) were for women only (table V–1, highest level of offering: Code I, p. 41). In terms of control, three-fifths of the junior colleges (397) were public. *Almost three-fifths (57.3 percent, or 153), in turn, of the* 267 under private control were denominational. Of these latter, somewhat more than half (80) were Roman Catholic. Of the 397 public junior colleges, 85.4 percent (339) were under district or city control, the remainder (58) being under State control.

In terms of programs (as categorized by the U.S. Office of Education), the most dominant type of junior college offered "liberal arts and general, and terminal occupational" programs. There were 381 of these, or 57.4 percent of the 664. The remaining 42.6 percent were scattered as follows: 85 (12.8 percent) were categorized as "liberal arts and general, terminal occupational, and teacher preparatory"; 73 (11 percent) were categorized as "liberal arts and general"; and 125 (18.8 percent) fell into six categories having a variety of combinations of programs (table V–2, highest level of offering: Code I, p. 42).

Table V–3 (highest level of offering: Code I, p. 43) provides data on the number of public and private junior colleges in the several States. California, in the vanguard of the so-called junior college movement, has the greatest number, 71 public and four private. Nevada, with its sparse population, is at the other extreme, having no junior college.

Although large junior colleges, particularly in the public sector, do exist, junior colleges are, on balance, small institutions (table V–4, p. 44). A distribution of junior colleges on the basis of faculty size into four class intervals (1–49, 50–99, 100–199, and 200–499) shows that

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[38] *Washington Monitor* (National Schools Public Relations Association, Mar. 21, 1966), p. 167.
[39] Washington, D.C.: Government Printing Office, 1966.
[40] Ibid., p. 1.

79 percent of all junior colleges have fewer than 50 faculty members (full-time equivalent faculty for resident instruction in degree-credit courses). Almost 70 percent of the public junior colleges fall into this category and all but 4.1 percent of the private. There are no private junior colleges having 100 or more faculty members; 7.5 percent of the public junior colleges fall into this category.

In terms of enrollment (in degree-credit courses), more than two-fifths (41.9 percent) of the private junior colleges had fewer than 200 students, and somewhat more than three-quarters had fewer than 500 students (table V–5, p. 44). In the public sector, about one-quarter of the junior colleges had fewer than 200 students; about one-half, fewer than 500 students; and about three-quarters, fewer than 1,000 students.

The number of junior colleges reported by the American Association of Junior Colleges has traditionally been larger than that reported by the U.S. Office of Education. This is caused by various factors: the AAJC includes within its count (unlike the U.S.O.E.) 2-year branch campuses of 4-year institutions; and its criteria for inclusion are somewhat more flexible than those of the U.S.O.E. For the fall of 1964 and 1965, respectively, the AAJC reported 716 and 767 junior colleges (table V–6, p. 44); the U.S.O.E. (in its *Education Directory—Part 3*) reported 656 and 664 respectively.

The foregoing demonstrates the existence of considerable diversity among junior colleges on the basis of selected quantitative factors. No attempt was made to demonstrate that considerable diversity exists also among 4-year institutions; nor that there is considerable similarity between the junior college sector and the 4-year sector with regard to various variables; i.e., that there is a considerable overlap between the junior college sector and the 4-year sector with regard to certain characteristics. For example, it was pointed out that 79 percent (456) of the junior colleges had fewer than 50 faculty members. Similarly, 43.7 percent (657) of the 4-year schools have fewer than 50 faculty members.

Figure V–2 (p. 45) presents "qualitative" data which demonstrate a considerable diversity among institutions within three higher educational universes (colleges, universities, and junior colleges), on the one hand, and a considerable overlap between universes, on the other.[41]

The factors, or scales,[42] involved are: Practicality, community, awareness, propriety, and scholarship—defined as follows:

> The *Practicality* scale suggests an instrumental emphasis in the college environment in which procedures, personal status, and practical benefits are important;
>
> The *Community* scale describes a friendly, cohesive, group-oriented campus. The environment is supportive and sympathetic, with feelings of group welfare and loyalty about the college;
>
> The *Awareness* scale suggests an emphasis on the expansion and enrichment of personality, of social horizons, and of expressiveness and sensitivity;
>
> The *Propriety* scale suggests an environment that is polite and considerate; and
>
> The *Scholarship* scale suggests an emphasis on competitively high academic achievement, intellectual discipline, and the rigorous pursuit of knowledge and theories for their own sake.

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[41] See C. Robert Pace, "Selective Higher Education for Diverse Students," in *Universal Higher Education*, by Earl J. McGrath, McGraw-Hill Book Co., New York, 1966, p. 164 ff.

[42] CUES, or college and university environment scales.

Since there are 30 statements in each scale, the scores for an institution can range from zero to 30. Looking at the scores obtained from a sample of 99 institutions, we can see how much diversity exists among schools within the same universe, and how much overlap between universes. The 99 schools include 32 junior colleges, 40 liberal arts colleges or others offering work no higher than a master's or first professional degree, and 27 universities offering advanced professional degrees and the Ph. D. The dotted line on figure V–3 (p. 43) is drawn at the approximate average score of 50 institutions that were selected to comprise a representative cross section of 4-year colleges and universities. *Junior colleges, for example,* spread over only half of the possible range. On three of the scales their scores cover the middle segment of the distribution—from moderately low to moderately high. On the other two scales, Awareness and Scholarship, their scores fall almost entirely within the lower half of the possible range.

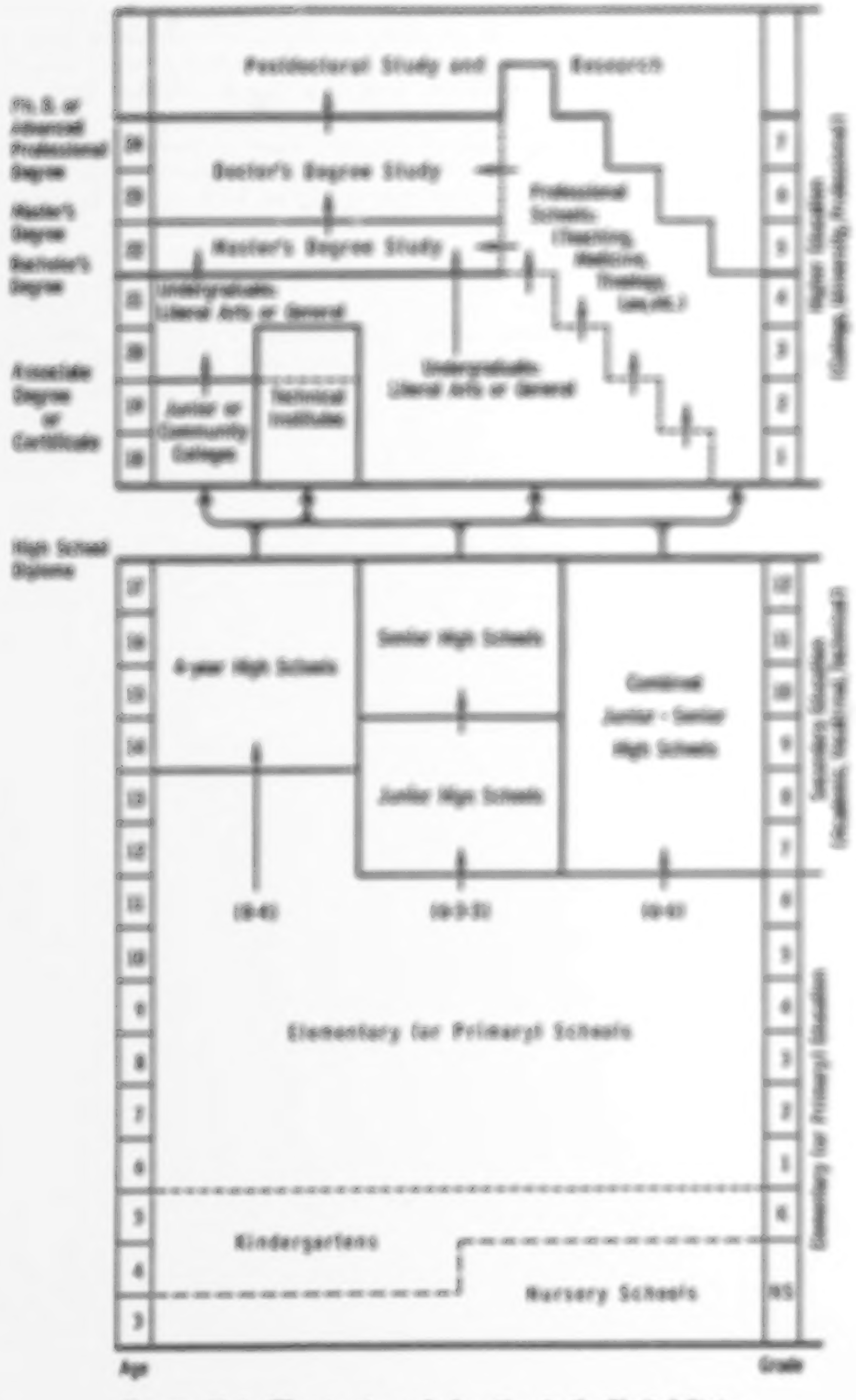
Postdoctoral Study and Research
Ph.D. or Advanced Professional Degree
Doctor's Degree Study
Master's Degree
Master's Degree Study
Bachelor's Degree
Professional Schools (Teaching, Medicine, Theology, Law, etc.)
Undergraduate Liberal Arts or General
Associate Degree or Certificate
Junior or Community Colleges
Technical Institutes
Undergraduate Liberal Arts or General
High School Diploma
4-year High Schools
Senior High Schools
Junior High Schools
Combined Junior - Senior High Schools
(8-4)
(6-3-3)
(6-6)
Elementary (or Primary) Schools
Kindergartens
Nursery Schools
Age
Grade
Higher Education (College, University, Professional)
Secondary Education (Academic, Vocational, Technical)
Elementary (or Primary) Education
N.S.

FIGURE V-1. *The structure of education in the United States*

SOURCE: *Progress of Public Education in the United States of America, 1965-1966*, U. S. Department of Health, Education, and Welfare, Office of Education (p. vi).

TABLE V-1.—*Number of institutions of higher education by institutional control, sex of student body, and highest level of offering: Aggregate United States, 1965–66*

Highest level of offering and sex of student body	Total	Public		Private			
		State	District or city	Independent of religious group	Religious group		
					Protestant	Roman Catholic	Other
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
I. 2 to 4 years beyond 12th grade:							
Coeducational	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Men	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
Women	[illegible]			[illegible]	[illegible]	[illegible]	
II. Bachelor's and/or 1st professional degree:							
Coeducational	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Men	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Women	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	
III. Master's and/or 2d professional degree:							
Coeducational	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Men	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	
Women	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	
IV. Doctor of philosophy or equivalent degree:							
Coeducational	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Men	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
Women	[illegible]	[illegible]		[illegible]		[illegible]	
V. Other:							
Coeducational	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	
Men	[illegible]	[illegible]				[illegible]	[illegible]
Women							

[1] Includes 13 under Federal control.
[2] Includes 82 proprietary.
[3] Includes 2 Greek Orthodox, 11 Interdenominational, 7 Jewish, 4 Latter Day Saints, 1 Reorganized Latter Day Saints, 2 Russian Orthodox, 1 Unitarian.
[4] Includes 1 under Federal control.
[5] Includes 20 proprietary.
[6] Includes 1 proprietary.
[7] Includes 6 proprietary.
[8] Includes 5 under Federal control.
[9] Under Federal control.
[10] Includes 2 proprietary.

Source: "*Education Directory, 1965-66, Part 3 Higher Education,*" U.S. Department of Health, Education, and Welfare, Office of Education 1966 (p. 11).

TABLE V-2.—*Number of institutions of higher education, by type of program and highest level of offering: Aggregate United States, 1965–66*

Type of program	Total	Highest level of offering				
		I	II	III	IV	V
		2 but less than 4 years of work beyond the 12th grade	Only the bachelor's and/or 1st professional degree	Master's and/or 2d professional degree	Doctor of philosophy and equivalent degree	Other
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(a) Terminal-occupational (below bachelor's degree)	[illegible]	[illegible]				[illegible]
(b) Liberal arts and general	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
(c) Liberal arts and general, and terminal-occupational	[illegible]	[illegible]	[illegible]	[illegible]		[illegible]
(d) Primarily teacher preparatory	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
(e) Both liberal arts and general and teacher preparatory	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
(f) Liberal arts and general, terminal-occupational, and teacher preparatory	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
(g) Professional only (not including teacher preparatory)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(h) Professional and teacher preparatory	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(i) Professional and terminal-occupational	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(j) Liberal arts and general with 1 or 2 professional schools	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]
(k) Liberal arts and general with 3 or more professional schools	[illegible]		[illegible]	[illegible]	[illegible]	

Source: *Education Directory, 1965–66, Part 3 Higher Education*, U.S. Department of Health, Education and Welfare, Office of Education, 1966 (p. 10).

TABLE [illegible].—*Number of institutions of higher education, by State, highest level of offering, and control: 1965-66*

State or outlying part	Total	Total		Highest level of offering									
		Public	Private	I		II		III		IV		V	
				Public	Private	Public	Private	Public	Private	Public	Private	Public	Private
Total	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Alabama	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Alaska	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Arizona	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Arkansas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
California	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Colorado	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Connecticut	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Delaware	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
District of Columbia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Florida	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Georgia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Hawaii	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Idaho	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Illinois	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Indiana	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Iowa	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kansas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Kentucky	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Louisiana	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maine	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Maryland	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Massachusetts	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Michigan	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Minnesota	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Mississippi	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Missouri	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Montana	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Nebraska	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Nevada	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New Hampshire	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New Jersey	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New Mexico	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
New York	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
North Carolina	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
North Dakota	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Ohio	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Oklahoma	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Oregon	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Pennsylvania	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Rhode Island	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
South Carolina	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
South Dakota	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Tennessee	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Texas	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Utah	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Vermont	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Virginia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Washington	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
West Virginia	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wisconsin	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Wyoming	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
OUTLYING PARTS OF THE UNITED STATES													
Canal Zone	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Guam	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Puerto Rico	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Virgin Islands	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Source: *Education Directory, 1965-66, Part 3, Higher Education*, U.S. Department of Health, Education, and Welfare, Office of Education, 1966 (p. 11).

TABLE V-4.—*Distribution of junior colleges,*[1] *by size of FTE faculty for resident instruction in degree-credit courses and by institutional control: Fall 1963*

Faculty size	Total Number	Total Percent	Public Number	Public Percent	Private Number	Private Percent
Total aggregate United States	577	100.0	360	100.0	217	100.0
1 to 49	457	79.2	248	68.9	209	96.3
50 to 99	77	13.3	69	19.2	8	3.7
100 to 199	30	5.2	30	8.3	0	
200 to 499	13	2.3	13	3.6	0	

[1] Excludes technical institutes and semiprofessional schools.

Source: Ralph E. Dunham and Patricia S. Wright, *Faculty and Other Professional Staff in Institutions of Higher Education, First Term 1963-1964* (Washington, D.C.: U.S. Office of Education, 1966) table 10, p. 16.

TABLE V-5.—*Distribution of junior colleges,*[1] *by size of enrollment in degree-credit courses and by institutional control: Fall 1964*

Enrollment size	Total Number	Total Percent	Public Number	Public Percent	Private Number	Private Percent
Total aggregate, United States	620	[2] 100.1	390	[2] 100.0	229	[2] 100.0
Under 200	147	23.7	51	13.1	96	41.9
200 to 499	184	29.6	109	27.9	75	32.8
500 to 999	129	20.8	90	23.1	39	17.0
1,000 to 2,499	97	15.6	78	20.0	19	8.3
2,500 to 4,999	38	6.1	36	9.2	2	.9
5,000 to 9,999	24	3.9	24	6.2	0	
10,000 to 19,999	4	.6	4	1.0	0	
20,000 or more	1	.2	1	.3	0	

[1] Excluded technical institutes and semiprofessional schools.
[2] Detail may not add to total because of rounding.

Source: USOE (unpublished data).

TABLE V-6.—*Distribution of junior colleges, by size of enrollment and by institutional control: Fall 1964 and fall 1965*

Enrollment	Public 1964	Public 1965	Private 1964	Private 1965	Total 1964	Total 1965
1 to 99	3	4	53	50	56	54
100 to 199	24	16	41	39	65	55
200 to 299	31	23	39	38	70	61
300 to 399	34	29	36	31	70	60
400 to 499	36	41	19	31	55	72
500 to 599	31	20	13	14	44	34
600 to 699	32	30	13	17	44	47
700 to 799	25	27	7	6	32	33
800 to 899	16	26	4	5	20	31
900 to 999	17	19	3	4	20	23
1,000 to 1,999	74	105	18	22	92	127
2,000 to 2,999	30	30	8	6	38	36
3,000 to 3,999	21	34	1	5	22	39
4,000 to 4,999	11	15	1	1	12	16
5,000 to 5,999	12	7			12	7
6,000 to 6,999	8	9			8	9
7,000 to 7,999	5	7			5	7
8,000 to 8,999	6	8			6	8
9,000 to 9,999	8	6			8	6
10,000 and over	13	23			13	23
Total	451	498	265	269	716	767

Source: AAJC, *1966 Junior College Directory.*

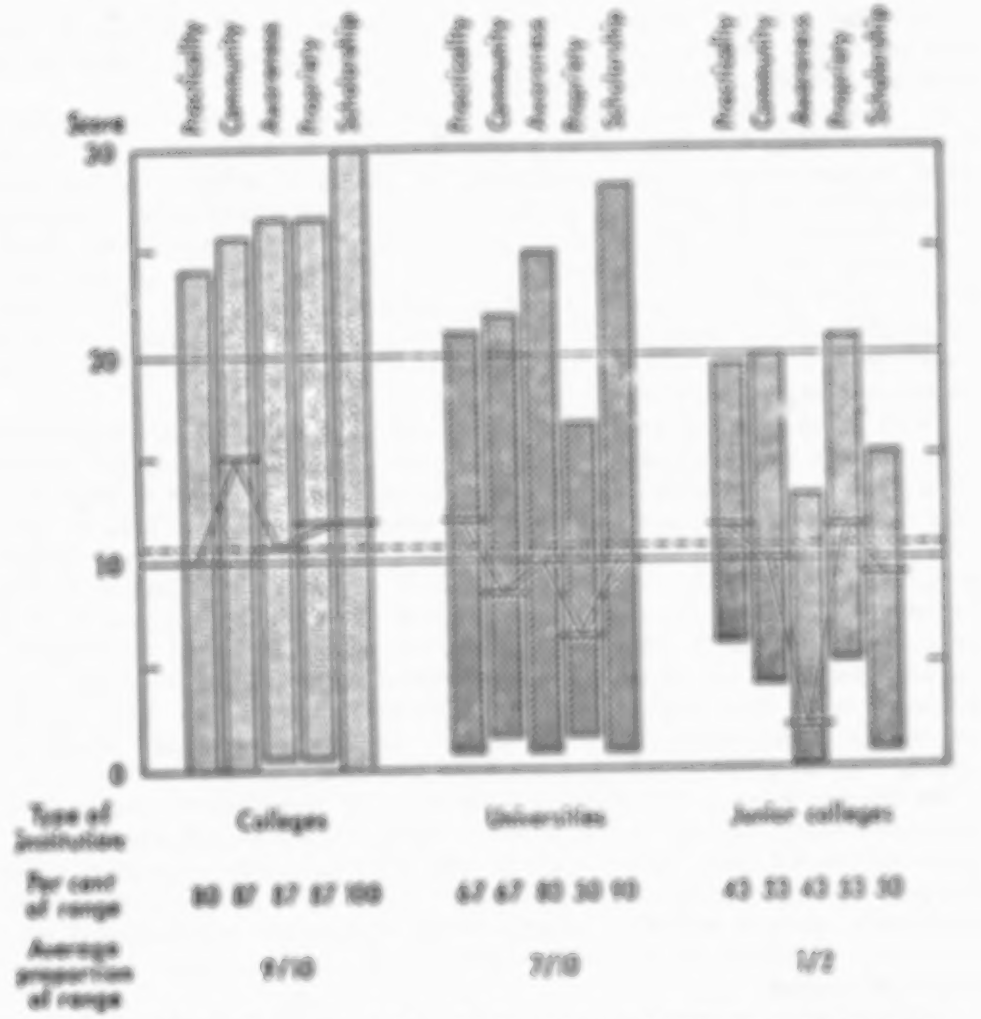

FIGURE V-2.—*The range of diversity in college and university environments*

Source: C. Robert Pace, "Selective Higher Education for Diverse Students," in *Universal Higher Education*, by Earl J. McGrath, McGraw-Hill Book Co., New York, 1966, p. [illegible].

VI. JUNIOR COLLEGE GROWTH [illegible]

However one elects to refer to it—something called the junior college (or the 2-year college, or the community college, or the community junior college), like Topsy, just growed—and rather phenomenally at that.

The first 2-year college was established more than a half century ago. Until the 1930's most 2-year colleges were private and almost entirely academic in orientation. Offering programs similar to the "lower division" of 4-year institutions, they became known as *junior* colleges. Since the 1920's and 1930's an increasing number of public 2-year colleges have been established, most of which offer a considerably more varied program than the private institutions. To a considerable degree, the programs of these institutions are determined by the needs of their local communities, hence the designation "community junior" college.

[illegible] U.S. Office of Education data exclusively are used in this section.

In what follows, various current aggregates, as of the fall of 1965 and as of the 1963–64 academic year, are presented first, followed by selected historical data and projections.

In the fall of 1965, 682 2-year institutions enrolled 1.2 million students (table VI–1, p. 47), or about one-fifth (19.7 percent) of the total higher educational enrollment of about 6 million. More than one-quarter (28.2 percent) of this junior college enrollment consisted of "students in occupational or general studies programs not chiefly creditable toward a bachelor's degree." (Relatively few of such students (16.5 percent) were found in 4-year institutions.) More than three-fifths (61.9 percent) of the degree-credit junior college students were men; a somewhat larger proportion (62.9 percent) of the non-degree-credit students were men.

Most of the non-degree-credit students are enrolled in "organized occupational curriculums." In the fall of 1964 (latest year for which such data are available) there were about 240,000 junior college students in "organized occupational curriculums" (table VI–2, p. 48), and about 280,000 [28] enrolled in "occupational or general studies programs not chiefly creditable toward a bachelor's degree." The former of these two figures is 85.8 percent of the latter. However, it is believed by the U.S. Office of Education personnel that an indeterminate number of organized-occupational-curriculum students are counted with the degree-credit enrollment, hence the 85.8 figure, ostensibly representing the incidence of "occupational" students among "nondegree" students, is somewhat suspect.

Be that as it may, 92,000 (38.3 percent) of the 240,000 students in organized occupational curriculums were in "science and engineering" curriculums. Of these, more than 30,000 (32.8 percent) were part-time. During the preceding academic year (1963–64), 2-year institutions graduated almost 40,000 students from organized occupational curriculums, of which more than 16,000 (43.2 percent) were in science and engineering.

Turning now to secular trends, and in terms exclusively of degree-credit enrollments (for which reasonably consistent secular series exist), we find the U.S. Office of Education reporting the existence of 46 junior colleges in 1917–18, with an enrollment of 4,500 (table VI–3, p. 48). By the fall of 1965, 682 junior colleges were enrolling almost 850,000 degree-credit students (table VI–4, p. 49). The U.S. Office of Education projects an enrollment of more than 1.5 million by the fall of 1975.

In terms of first-time freshman enrollments—there was an increase from 140,000 in 1955 to 400,000 in 1965, and the estimate for 1975 is for more than 600,000 (table VI–5, p. 50).

Increasingly, junior colleges have absorbed larger segments of higher educational enrollments: 1.4 percent in 1920, 10 percent in 1940, 12.1 percent in 1960, 15.2 percent in 1965, and (the U.S. Office of Education conservatively estimates) 16.9 percent in 1975. The progression is somewhat more marked in terms of undergraduate enrollments: 1.4 percent (1920), 10.8 percent (1940), 12.5 percent (1960), 17 percent (1965), and 19.2 percent (1975).

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[28] U.S. Office of Education, *Opening (Fall) Enrollment in Higher Education, 1964* (Washington, D.C.: Government Printing Office, 1964).

Of more relevance is the incidence of *lower-division* enrollments on junior college campuses. Unfortunately, national data on such enrollments are not available. An estimate of about 30 percent would probably not be too far wide of the mark.

To recapitulate: Junior colleges currently account for about 15 percent of total higher educational enrollment; for about 17 percent of undergraduate enrollment; and for probably somewhat less than 30 percent of lower-division enrollment. It should be repeated that these percentages relate to degree-credit enrollment. If non-degree-credit students are included in the estimate of the current incidence of lower-division enrollments on junior college campuses, the estimate would probably be somewhat in excess of 35 percent.

The most striking development in education at the post-secondary level has been the extent to which the public sector has virtually taken over, in terms of enrollments, the junior college sector of higher education. From 1920 to 1940, the percentage of junior college students attending public junior colleges virtually doubled, from 36.3 percent to 71.8 percent. By 1960, the ratio has further significantly increased to 86.7 percent. The percentage for 1965 was 87.7, and the estimate for 1975 is 89 percent. These percentages are in terms of degree-credit enrollment, and would be somewhat higher, particularly for the later years, were non-degree-credit enrollment taken into account.

TABLE VI-1.—*Total enrollment in institutions of higher education, by sex and by type and control of institution: United States and outlying areas, fall 1965*

Type and control of institution	All students	Students taking work creditable toward a bachelor's or higher degree			Students in occupational or general studies programs not chiefly creditable toward a bachelor's degree		
		Total	Men	Women	Total	Men	Women
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
All institutions	5,967,411	5,570,271	3,396,574	2,173,697	397,140	256,101	141,039
2-year institutions	1,176,852	845,244	529,532	315,712	331,608	211,829	119,779
4-year institutions	4,790,559	4,725,027	2,867,042	1,857,985	65,532	44,272	21,260
Universities	2,085,136	2,056,777	1,351,553	705,224	28,359	20,600	7,759
Liberal arts colleges	1,575,662	1,553,783	845,368	708,415	21,019	11,873	9,146
Independently organized professional schools:							
Teachers colleges	373,314	371,497	166,109	205,388	1,817	1,030	787
Technological schools	142,053	134,663	121,626	13,037	7,390	6,477	913
Theological, religious	69,628	68,404	57,297	11,107	1,224	590	634
Schools of art	25,717	25,119	10,326	14,793	598	245	353
Other professional	96,082	90,394	71,952	18,442	5,688	2,125	3,563
Public institutions	3,969,540	3,624,178	2,175,252	1,448,926	345,362	227,930	117,432
Private institutions	1,997,871	1,946,093	1,221,322	724,771	51,778	28,171	23,607

NOTE.—Includes resident and extension students.

Source: U.S. Department of Health, Education, and Welfare, Office of Education, "Opening Fall Enrollment in Higher Education, 1965." Secondary source: U.S. Office of Education, *Digest of Educational Statistics, 1966* (Washington, D.C.: Government Printing Office, 1966) p. 64.

TABLE VI-2.—*Number of graduates by sex, 1960-61, and full- and part-time enrollment, fall 1961, in organized occupational curriculums in institutions of higher education: United States and outlying areas*

Organized occupational curriculums	Graduates			Enrollment		
	Total	Men	Women	Total	Full-time	Part-time
(1)	(2)	(3)	(4)	(5)	(6)	(7)
All curriculums ¹	66,112	40,380	25,732	510,412	387,000	123,400
Science and engineering	29,757	27,712	2,045	155,001	90,030	65,001
All other curriculums	36,356	12,667	23,687	355,411	298,000	56,973
2- or 3-year curriculums	49,169	27,577	21,187	293,702	197,087	96,700
Science and engineering	21,360	16,395	4,965	115,890	84,315	30,300
All other curriculums	28,010	11,782	16,224	177,969	113,500	63,402
1-year curriculums	7,097	3,093	4,370	22,490	10,851	11,639
Science and engineering	4,010	2,110	2,710	11,000	6,927	4,069
All other curriculums	3,739	980	1,673	11,355	4,960	6,111
4-year institutions	17,060	8,470	8,600	70,817	51,150	20,650
Science and engineering	10,300	5,370	4,020	40,190	28,487	12,040
All other curriculums	7,460	3,107	4,360	30,061	24,073	12,000
2-year institutions	50,190	32,000	17,390	229,000	100,700	62,700
Science and engineering	19,405	15,420	3,080	95,405	62,125	30,224
All other curriculums	31,085	9,400	13,251	140,150	80,000	21,000

¹ Excludes curriculums below the technician or semiprofessional level.

Source: U.S. Department of Health, Education, and Welfare, Office of Education, unpublished data from the survey of "Organized Occupational Curriculums." U.S. Office of Education, *Digest of Educational Statistics, 1963* (Washington, D.C.: Government Printing Office, 1963) p. 73.

TABLE VI-3.—*Enrollment in junior colleges,¹ by type of control: United States, 1917-18 to fall 1963*

Academic year	All junior colleges		Publicly controlled		Privately controlled	
	Number	Enrollment	Number	Enrollment	Number	Enrollment
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1917-18	46	4,504	14	1,367	32	3,137
1919-20	52	8,102	10	2,940	42	5,162
1921-22	80	12,124	17	4,771	63	7,353
1923-24	132	20,559	39	9,240	93	11,319
1925-26	153	27,095	47	13,859	106	13,236
1927-28	248	44,855	114	28,437	134	16,418
1929-30	277	55,616	129	36,501	148	19,115
1931-32	342	85,063	159	58,887	183	26,176
1933-34	322	78,480	152	55,869	170	22,611
1935-36	415	102,453	187	70,557	228	31,896
1937-38	453	121,510	209	82,041	244	39,469
1939-40	456	149,854	217	107,553	239	42,301
1941-42	461	141,272	231	100,783	230	40,489
1943-44	413	89,208	210	60,884	203	28,324
1945-46	464	155,498	242	109,640	222	45,858
1947-48	472	240,173	242	178,196	230	61,977
1949-50	506	243,930	279	188,794	227	55,045
1951-52	506	231,175	301	184,054	213	47,121
1953-54	524	325,604	369	272,000	225	53,700
November 1955	469	295,853	279	249,925	190	45,828
1st term, 1957-58	490	349,363	283	297,000	207	51,708
1st term, 1959-60	509	403,724	310	348,538	199	54,964
1st term, 1961-62	524	533,840	329	471,536	195	62,320
Fall 1963	573	618,657	357	546,111	216	72,646

¹ Includes 2-year normal schools in 1949-50 and subsequent years.

NOTE.—Includes full- and part-time resident students taking work creditable toward a bachelor's degree. Beginning in 1959-60, data are for 50 States and the District of Columbia.

Source: U.S. Department of Health, Education, and Welfare, Office of Education, *Biennial Survey of Education in the United States;* and comprehensive surveys of enrollment in institutions of higher education. U.S. Office of Education, *Digest of Educational Statistics, 1963* (Washington, D.C.: Government Printing Office, 1963) p. 71.

TABLE VI-4.—*Total opening fall degree credit enrollment in 2-year institutions of higher education, by sex, by attendance status, and by control of institutions: United States, 1955–75* [1]

Year (fall)	Total degree-credit enrollment	Sex		Attendance status [2]		Control	
		Men	Women	Full time	Part time	Public	Private
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1955	308,411	196,671	111,740	172,000	137,000	265,326	43,085
1956	347,345	225,626	121,719	194,000	153,000	297,621	49,724
1957	369,162	237,679	131,483	206,000	163,000	315,990	53,172
1958	385,709	248,200	137,509	215,000	171,000	330,981	54,728
1959	409,715	260,754	148,961	226,000	184,000	355,967	53,748
1960	451,333	282,155	169,178	247,000	205,000	392,310	59,023
1961	517,925	320,156	197,769	293,000	225,000	456,381	61,544
1962	589,529	365,624	223,905	317,193	272,336	519,257	70,272
1963	624,789	386,660	238,129	327,218	297,571	551,308	73,481
1964	710,859	439,539	271,320	396,376	314,483	620,850	90,009
1965	841,437	521,846	319,591	495,454	345,983	737,890	103,547
PROJECTED [3]							
1966	934,000	580,000	354,000	549,000	385,000	819,000	115,000
1967	1,023,000	625,000	398,000	600,000	423,000	900,000	123,000
1968	1,092,000	675,000	417,000	641,000	452,000	962,000	130,000
1969	1,127,000	696,000	431,000	660,000	467,000	995,000	132,000
1970	1,182,000	722,000	460,000	692,000	491,000	1,045,000	137,000
1971	1,241,000	755,000	486,000	725,000	516,000	1,099,000	142,000
1972	1,316,000	801,000	516,000	768,000	548,000	1,168,000	148,000
1973	1,386,000	840,000	546,000	808,000	577,000	1,230,000	156,000
1974	1,458,000	883,000	575,000	850,000	608,000	1,296,000	162,000
1975	1,521,000	918,000	603,000	886,000	635,000	1,353,000	168,000

[1] Sources: Enrollment data and estimates are based on U.S. Department of Health, Education, and Welfare, Office of Education circulars: (1) "Opening (Fall) Enrollment in Higher Education," annually, 1955 through 1965; and (2) "Resident and Extension Enrollment in Institutions of Higher Education," biennially 1955 through 1961. Population on which projections are based is shown in appendix table E.

[2] Total opening fall degree-credit enrollment by attendance status for 1955 through 1961 is estimated from 1st-term enrollment by attendance status reported in "Comprehensive Report on Enrollment" surveys, biennially, 1955 through 1961.

[3] The projection of total opening fall degree-credit enrollment in 2-year institutions by sex and control of institution is based on the assumption that attendance rates of men and of women aged 18–21 years will follow the 1955–65 trend to 1975 in each category of enrollment. The projection of total opening fall degree-credit enrollment in 2-year institutions of higher education by attendance status is based on the assumption that in each enrollment category the 1965 ratio of full-time enrollment to total enrollment will remain constant to 1975. The projections include in each year, in addition to the number of enrollments based on the 1955–65 trend, an estimated 10,000 veterans enabled to attend college through aid provided by the Veterans' Readjustment Benefits Act of 1966. Veterans who would have attended without this assistance are assumed to be included in the trend projections. For further methodology details, see appendix table A.

NOTE.—Data are for 50 States and the District of Columbia for all years. Because of rounding, detail may not add to totals.

Secondary Source: U.S. Office of Education, *Projections of Educational Statistics to 1975–76* (Washington D.C.: Government Printing Office, 1966), p. 12.

TABLE VI–5.—*1st-time opening fall degree-credit enrollment in 2-year institutions of higher education, by sex and by control of institutions: United States, 1955–75* [1]

Year (fall)	1st time degree-credit enrollment	Sex		Control	
		Men	Women	Public	Private
(1)	(2)	(3)	(4)	(5)	(6)
1955	139,969	86,176	53,793	117,288	22,681
1956	162,810	101,610	61,200	137,403	25,404
1957	167,640	104,037	63,603	140,522	27,118
1958	174,949	107,744	67,205	146,379	28,570
1959	181,679	111,257	70,422	153,393	28,286
1960	213,976	128,570	85,406	181,860	32,116
1961	243,777	145,665	98,112	210,101	33,676
1962	260,440	156,163	104,277	224,537	35,903
1963	271,673	163,062	108,611	234,757	36,91
1964	322,241	193,407	128,834	275,413	46,828
1965	400,797	241,426	159,371	347,788	53,009
PROJECTED [2]					
1966	409,000	247,000	162,000	355,000	54,000
1967	421,000	253,000	168,000	366,000	55,000
1968	441,000	265,000	176,000	384,000	57,000
1969	466,000	279,000	187,000	406,000	59,000
1970	493,000	294,000	199,000	431,000	62,000
1971	519,000	308,000	211,000	454,000	65,000
1972	543,000	322,000	221,000	476,000	68,000
1973	567,000	336,000	231,000	498,000	70,000
1974	590,000	348,000	242,000	518,000	72,000
1975	611,000	360,000	252,000	537,000	74,000

[1] Sources: Enrollment data from U.S. Department of Health, Education, and Welfare, Office of Education circulars; "Opening (Fall) Enrollment in Higher Education," annually, 1955 through 1965.

Population on which projections are based is shown in appendix table E.

[2] The projection of 1st-time opening fall degree-credit enrollment in 2-year institutions of higher education by sex and by control of institution is based on the assumption that entrance rates of 18-year-old men and of 18-year-old women into 2-year institutions will follow the 1955–65 trend to 1975 in each category of enrollment.

The projections include in each year, in addition to the number of enrollments based on the 1955–65 trend, an estimated 5,000 veterans enabled to attend college through aid provided by the Veterans' Readjustment Benefits Act of 1966. Veterans who would have attended without this assistance are assumed to be included in the trend projections.

For further methodology details, see appendix table A.

Secondary source: U.S. Office of Education, *Projections of Educational Statistics to 1975–76* (Washington, D.C., Government Printing Office, 1966) p. 15.

NOTE.—Data are for 50 States and the District of Columbia for all years. Because of rounding, detail may not add to totals.

VII. THE JUNIOR COLLEGE AS A RESOURCE FOR SCIENCE

A crude but informative assessment of the relative importance of science within junior colleges can be made by comparing such institutions with 4-year colleges and universities in terms of selected expenditure and manpower variables. For present purposes, 4-year colleges and universities are categorized as science-degree granting and non-science-degree granting; the former are, in turn, further classified by level of science degree granted. The dollar variables consist of expenditures for separately budgeted research and development; capital expenditures for scientific and engineering facilities and equipment for research, development, and instruction in the sciences; and expenditures for instruction and departmental research in the sciences, including the social sciences. The manpower variables consist of total professional personnel—full time and part time—and FTE—full-time equivalent—scientists and engineers.

The data are derived from a National Science Foundation survey which covered 1,942 institutions believed to have programs in the sciences and engineering.[45] They included all institutions listed in the U.S. Office of Education's *Directory, Higher Education, Part 3, 1963–64*, except for about 250 independent schools of music, art, theology, law, and other specialized institutions that do not normally maintain science and engineering programs.

These data show (table VII–1, p. 53) that current expenditures for separately budgeted research and development performed in colleges and universities totaled $1.3 billion in 1963–64. Federal contract research centers accounted for an additional $0.6 billion. Expenditures at junior colleges were $1.2 million. Similarly, junior colleges spent a larger but still relatively small sum—$20 million—for "science plant" out of a total of $0.5 billion spent by colleges and universities "proper," that is, excluding Federal contract research centers. Not surprisingly, since they stress the teaching function, junior colleges spent relatively greater amounts on instruction and departmental research, $75 million out of a total of $1.6 billion for all of higher education.

Manpower data show that there were 466,000 professional staff—full time and part time—on higher educational campuses, of which 38,000 were in junior colleges. Corresponding figures for FTE scientists and engineers are about 193,000 and 10,000, respectively.

In short, although junior colleges constitute a major segment of the higher educational universe in terms of number of institutions—almost one-third—their resources for science, in terms of expenditures and manpower, are minimal. Their share of expenditures for separately budgeted research and development was 0.1 percent of the total for colleges and universities proper; for science plant, 3.7 percent; and for instruction and departmental research, 4.8 percent (table VII–2, p. 54). Slightly more than 8 percent of total professional staff and 5 percent of FTE scientists and engineers were on junior college campuses. The near equivalence of the percentage for instruction and departmental research—4.8 percent—and for FTE scientists and engineers—5 percent—is worthy of note as representing, perhaps, a consistency in the scarcity of resources for science.

Institutions which grant the bachelor's degree in science as the highest level of science degree, although they constitute a not much larger segment—38.1 percent—of the higher educational universe than the junior colleges—31.5 percent—account for roughly twice the staff, in terms both of total professional staff and of FTE scientists and engineers. The same relationship obtains in the case of expenditures for instruction and departmental research, with the difference being somewhat greater for expenditures for plant, and considerably greater for expenditures for separately budgeted research and development. Correspondingly, however, the resources for science of institutions granting science baccalaureates, but no advanced science degrees, is meager in comparison with the totality of institutions granting science degrees; although constituting about two-thirds of such institutions, they account for about one-ninth of the FTE scientists and engineers.

Table VII–3 (p. 54) presents the three expenditure and two manpower variables on a per institution basis. Although such normative data must be used with extreme caution, they do raise issues of some merit. By way of illustration, junior colleges are shown to have, on balance, 16 FTE scientists and engineers per institution; institutions granting science baccalaureates, 27 per institution. Hundreds of junior colleges have fewer than a half-dozen FTE scientists and engineers; hundreds of science-baccalaureate institutions, fewer than a dozen. The questions which inevitably insinuate themselves are: What is critical size in terms of scientific manpower for efficient teaching in science in an institution of higher education? What is critical size in terms of at least salutary, and possibly necessary, "colleagueship"? What is critical size in terms of various categories of expenditures for science?

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[45] National Science Foundation, *Resources for Scientific Activities at Universities and Colleges, 1964* (Washington, D.C.: GPO, 1966) (in process).

Table VII-4 (p. 55) presents data on the various expenditure variables per professional staff member and per FTE scientist and engineer. Here again the issue of critical size injects itself. Average expenditures per staff member for separately budgeted research and development in junior colleges are, not unexpectedly, minimal. Corresponding expenditures for institutions granting science baccalaureates and science master's are considerably higher, but still small when compared with institutions granting science doctorates.

The comparability of the expenditures for instruction and departmental research per FTE scientist and engineer for the several categories of institutions should be noted. The figure for the junior colleges is $7,800; for science-degree granting institutions and non-science-degree granting institutions, $8,100 and $8,500, respectively; for the three levels of science-degree granting institutions, as follows: doctorate, $7,800; master's, $9,800; and, baccalaureate, $8,300. The $7,800 figure both for junior colleges and for institutions granting science doctorates is fortuitous. Since many scientists and engineers in the doctoral institutions are involved not in "instruction and departmental research" but in "separately budgeted research," an adjustment for this factor would make the figure for the doctoral institutions probably considerably higher, in terms of relevant staff.

Relating some of the variables used above to *enrollment* data would enhance the analysis. The study which produced these data, however, did not obtain enrollment figures. The types of enrollment data available from other sources are not particularly relevant to the institutional categories used here.

TABLE VII-1.—*Expenditures for separately budgeted R. & D., for R. & D. plant, and for instruction and departmental research in science in colleges and universities, 1963–64; and total professional personnel and total FTE scientists and engineers, January 1965*

[Dollar amounts in thousands]

Institutional type	Number of institutions	Separately budgeted R. & D.		R. & D. plant [1]		Instruction and departmental research	Total, professional personnel	Total FTE scientists and engineers
		Total	Federally financed	Total	Federally financed			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total [2]	1,942	$1,272,436	$917,322	$529,492	$134,439	$1,553,094	446,096	192,606
Science degree granting	1,139	1,268,601	914,841	502,224	132,203	1,442,801	413,422	178,683
Doctorate	180	1,225,079	1,884,957	391,721	122,530	1,078,885	280,426	137,862
Master's	220	33,379	22,165	58,790	5,968	201,577	65,416	20,558
Bachelor's	739	10,143	7,719	51,712	3,705	167,369	67,580	20,263
Nonscience degree granting	117	878	543	1,734	603	18,732	7,447	2,200
Nondegree granting	686	2,957	1,938	25,535	1,633	91,561	45,227	11,723
Junior colleges	611	1,184	1,153	19,739	1,547	74,857	38,341	9,641
Other	75	1,773	785	5,796	86	16,704	6,886	2,082
EXHIBITS								
Agricultural experiment stations	59	208,744	71,036	29,356	7,325	63,301	25,250	18,950
Federal contract research centers	32	629,207	629,166	146,934	146,478	1,354	12,587	11,296

[1] Includes capital expenditures for scientific and engineering facilities and equipment for research, development, and instruction.

[2] Universities and colleges proper, including agricultural experiment stations, but not Federal contract research centers.

Source; National Science Foundation, *Resources for Scientific Activities at Universities and Colleges, 1964* (Washington, D.C., GPO, 1966) (in process).

TABLE VII-2.—*Percentage distribution of expenditures (1963–64) for separately budgeted R. & D., for R. & D. plant, and for instruction and departmental research in science; and of total professional staff and FTE scientists and engineers among institutions of higher education*

Institutional type (1)	Number of institutions (2)	Separately budgeted R. & D. (3)	R. & D. plant [1] (4)	Instruction and departmental research (5)	Total professional staff (6)	FTE scientists and engineers (7)
Total [2]	100.0	100.0	100.0	100.0	100.0	100.0
Science degree granting	58.6	99.7	94.9	92.9	88.7	92.8
Doctorate	9.2	96.3	74.0	69.1	60.2	71.6
Master's	11.3	2.6	11.1	13.0	14.0	10.7
Bachelor's	38.1	.8	9.8	10.8	14.5	10.5
Nonscience degree granting	6.0	.1	.3	1.2	1.6	1.1
Nondegree granting	35.3	.2	4.8	5.9	9.7	6.1
Junior colleges	31.5	.1	3.7	4.8	8.2	5.0
Other	3.9	.1	1.1	1.1	1.5	1.1

[1] Includes capital expenditures for scientific and engineering facilities and equipment for research, development, and instruction.

[2] Universities and colleges proper, including agricultural experiment stations, but not Federal contract research centers.

Source: National Science Foundation, "*Resources for Scientific Activities at Universities and Colleges, 1964,*" (Washington, D.C.: GPO, 1966) (in process).

TABLE VII-3.—*Expenditures (1963–64) for separately budgeted R. & D., for R. & D. plant, and for instruction and departmental research for science per institution of higher education; and total professional staff and FTE scientists and engineers (January 1965) per institution.*

[Dollar amounts in thousands]

Institutional type (1)	Number of institutions (2)	Separately budgeted R. & D. (3)	R. & D. plant [1] (4)	Instruction and departmental research (5)	Total professional personnel (6)	FTE scientists and engineers (7)
Total [2]	1,942	$655	$273	$800	240	99
Science degree granting	1,139	1,114	441	1,267	363	157
Doctorate	180	6,806	2,176	5,966	6,806	766
Master's	220	152	267	916	297	93
Bachelor's	739	14	70	226	91	27
Nonscience degree granting	117	8	15	160	64	19
Nondegree granting	686	4	37	133	66	17
Junior colleges	611	2	32	123	63	16
Other	75	24	77	223	92	28
EXHIBITS						
Agricultural experiment stations	59	3,538	498	1,073	428	321
Federal contract research centers	32	19,663	4,592	42	393	353

[1] Includes capital expenditures for scientific and engineering facilities and equipment for research, development, and instruction.

[2] Universities and colleges proper, including agricultural experiment stations, but not Federal contract research centers.

Source; National Science Foundation, *Resources for Scientific Activities at Universities and Colleges, 1964,* Washington, D.C.; GPO, 1966) (in process).

TABLE VII-4.—*Expenditures (1963–64) for separately budgeted R. & D., for R. & D. plant, and for instruction and departmental research in science per professional staff member and per FTE scientist and engineer (January 1965) in colleges and universities; and ratio of professional staff to FTE scientists and engineers*

[Dollar amounts in thousands]

Institutional type	Number of institutions	Expenditures						Ratio of professional personnel to FTE scientists and engineers
		Per professional staff member for—			Per FTE scientist and engineer for—			
		Separately-budgeted R. & D.	R. & D. plant[1]	Instruction and departmental research	Separately-budgeted R. & D.	R. & D. plant	Instruction and departmental research	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total[2]	1,942	$2.73	$1.14	$3.33	$6.61	$2.75	$8.06	2.4
Science degree granting	1,139	3.07	1.21	3.49	7.10	2.81	8.07	2.3
Doctorate	180	4.37	1.40	3.83	8.89	2.84	7.79	2.0
Master's	220	.51	.90	3.08	1.62	2.86	9.81	3.2
Bachelor's	739	.15	.77	2.48	.50	2.55	8.26	3.3
Nonscience degree granting	117	.12	.23	2.52	.40	.79	8.51	3.4
Nondegree granting	686	.07	.56	2.02	.25	2.18	7.81	3.9
Junior colleges	611	.03	.51	1.95	.12	2.05	7.76	4.0
Other	75	.26	.84	2.43	.85	2.78	8.02	3.3
EXHIBITS								
Agricultural experiment stations	59	8.27	1.16	2.51	1.02	1.55	3.34	.75
Federal contract research centers	32	49.99	11.67	.11	55.70	13.01	.12	.90

[1] Includes capital expenditures for scientific and engineering facilities and equipment for research, development, and instruction.

[2] Universities and colleges proper, including agricultural experiment stations, but not Federal contract research centers.

Source: National Science Foundation, *Resources for Scientific Activities at Universities and Colleges, 1964* (Washington, D.C., GPO, 1966) (in process).

VIII. Junior College Staff as Scientists

For the purpose of this section, data of the National Register of Scientific and Technical Personnel have been "mined" in an attempt (1) to ascertain the extent of participation of junior college personnel in the register, and (2) to obtain data on selected characteristics of such participants. In what follows, the universe of "junior college scientists" is compared[46] with the totality of college and university scientists (higher education scientists) in terms of the following selected characteristics: highest degree attained, academic rank, work activity and field, extent of Federal support and the Federal program involved, age and experience, sex distribution, and State of employment. These comparisons are made for data from the 1964 National Register. In addition, selected data for junior college scientists from the 1966 National Register are presented. These latter will be referred to only when significantly different from those for 1964.

In order better to understand the concept of "scientist" within the context of National Register data, a brief digression is necessary.

The National Register of Scientific and Technical Personnel is maintained as a cooperative venture of the National Science Foundation and the scientific community, as represented by various scientific professional societies. The Foundation attempts to develop uniform standards and procedures and the cooperating societies undertake to identify qualified scientists to insure as complete coverage as possible of eligible personnel. Scientists are considered eligible for inclusion if they have "full professional standing" as determined by the appropriate participating society; and the eligibility criteria vary considerably among the several societies.

The coverage of the National Register has been continually improving. It is estimated that the 1964 registration, for example, included over 90.0 percent of the Nation's science doctorates. Although the ratio varies by field, it is believed that about three-quarters of all eligible scientists are actually included.

In 1964, the fields covered by the National Register included the life and physical sciences and, for the first time, selected social sciences, including economics, linguistics, and sociology.

Of the 224,000 scientists in the 1964 National Register, almost 80,000, or somewhat more than one-third, were employed by higher educational institutions.[47] Of these, in turn, fewer than 2,000 (2.3 percent) were on the staffs of junior colleges (table VIII–1, p. 58). Ph. D.'s among junior college scientists were about half as prevalent as among higher education scientists in general—26.8 percent as compared with 54.2 percent. Almost two-thirds of junior college scientists held master's degrees, and about one-quarter of all higher education scientists. Coverage of junior college personnel increased significantly from 1964 to 1966, from 1,825 to 2,518, or about 38.0 percent. This compares very favorably with the increase in total coverage from 224,000 to 243,000, or about 8.4 percent.

When classified on the basis of primary work activity, junior college scientists fall predominantly into the teaching category (83.6 percent), with 5.4 percent in research and development, and 6.1 percent in management or administration (table VIII–2, p. 58). About one-third of higher education scientists reported research and development as their primary work activity and about one-half reported teaching.

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[46] More meaningful, of course, would be a comparison (which the state of the arts does not permit) of "junior college scientists" with nonjunior college academic scientists engaged in teaching "lower division" students.

[47] A small but indeterminable number was actually employed by secondary school systems. These are ignored in the discussion.

Only 8.4 percent of higher education scientists employed as teachers held the rank of instructor (table VIII–3, p. 59), almost one-third (31.5 percent) of junior college scientists. The distribution by rank of higher education scientists was: 26.3 percent professors, 20.9 percent associate professors, 22.9 percent assistant professors, 8.4 percent instructors, and 21.4 percent various other designations. The corresponding percentages for junior college teacher-scientists, respectively, were: 12.6, 12.4, 16.0, 31.5, and 27.4.

The greatest number of higher education scientists (20.4 percent) reported themselves (table VIII–4, p. 60) as working in the biological sciences; the greatest number of the junior college scientists, in physics (16.1 percent). The fields that accounted for 10 percent or more of higher education scientists were the biological sciences (20.4 percent), chemistry (17.5 percent), physics (14.9 percent) and psychology (10.5 percent). Correspondingly, for junior college scientists: physics (16.1 percent), mathematics (14.8 percent), chemistry (14.6 percent), the biological sciences (13.9 percent) and psychology (10.9 percent). The most noteworthy disparity is in the biological sciences and in mathematics, with the junior colleges being, relatively, much stronger in mathematics and much weaker in the biological sciences.

Almost half (48.8 percent) of all higher education scientists reported (table VIII–5, p. 60) having received support from the Federal Government, fewer than one-fifth (18.7 percent) of junior college scientists. In terms of programs, more than one-half of the junior college scientists who reported receiving support were receiving support from Federal "education" programs. "Health" was the most popular program for higher education scientists, about one-third of those receiving support reporting it as originating in health programs.

Junior college scientists are older than higher education scientists (table VIII–6, p. 61), the modal class interval for the former being 35–39 years of age, for the latter, 30–34 years of age. A greater proportion of junior college scientists than of higher education scientists is in each of the 5-year class intervals from 35–39 and older. Correspondingly, a smaller proportion is in each of the three lower class intervals; namely; 20–24, 25–29, and 30–34.

About four-tenths (39.9 percent) of all higher education scientists are in these three class intervals and only about three-tenths (29.4 percent) of junior college scientists.

Data on years of professional experience (table VIII–7, p. 61) corroborate the age-distribution data. Almost one-quarter (24 percent) of all higher education scientists had 4 or fewer years of experience, only 15.2 percent of junior college scientists. Correspondingly, 84.8 percent of junior college scientists, and 76 percent of higher education scientists, had 5 or more years of professional experience.

Of the 224,000 scientists in the 1964 National Register, some 8,000 (3.7 percent) were women (table VIII–8, p. 62). Of the 1,825 junior college scientists in the register, 225 (12.3 percent) were women. The base upon which the percentage is computed is, of course, low; the increase of from 225 to 322 junior college women scientists (43.1 percent) from 1964 to 1966 should, however, be noted.

The importance of junior colleges in California is reflected in the distribution of National Register scientists by State (table VIII–9, pp. 62, 63). California accounts for only 11.5 percent of all higher education scientists, but for almost one-third (32.1 percent) of junior college scientists. The figures for New York State, on the other hand, are almost identical—10.8 percent of all higher education scientists and 10.7 percent of junior college scientists. Twenty-three jurisdictions (including the District of Columbia and Puerto Rico) have fewer than 10 junior college scientists (Nevada, of course, has neither junior college scientists nor junior colleges).

TABLE VIII-1.—*Scientists* [1] *employed in all colleges and universities, and in junior colleges, by highest degree held, 1964; and in junior colleges, 1966*

Highest degree	1964				1966	
	Number		Percent [2]		Junior colleges	
	All	Junior colleges	All	Junior colleges	Number	Percent [2]
Total	77,727	1,825	100.0	100.0	2,518	100.0
Doctor of philosophy	42,112	490	54.2	26.8	705	28.0
Professional medical	2,986	6	3.8	.3	12	.5
Master's	22,044	1,161	28.4	63.6	1,591	63.2
Bachelor's	10,212	164	13.1	9.0	202	8.0
Less than bachelor's	85	2	.1	.1	3	.1
No report	288	2	.4	.1	5	.2

[1] Those included in the National Register of Scientific and Technical Personnel.

[2] May not add to 100 percent because of rounding.

Source: National Science Foundation, *National Register of Scientific and Technical Personnel*, 1964 and 1966.

TABLE VIII-2.—*Scientists* [1] *employed in all colleges and universities, and in junior colleges, by primary work activity, 1964; and in junior colleges, 1966*

Work activity	1964				1966, junior colleges	
	Number		Percent [2]			
	All	Junior colleges	All	Junior colleges	Number	Percent [2]
Total	77,727	1,825	100.0	100.0	2,518	100.0
Research and development	26,392	98	33.9	5.4	169	6.7
Basic research [3]	19,894	72	25.6	3.9	140	5.6
Applied research [3]	6,047	24	7.8	1.3	26	1.0
Management or administration	5,778	111	7.4	6.1	169	6.7
Management or administration of research and development [3]	2,793	18	3.6	1.0	18	.7
Teaching	39,926	1,525	51.3	83.6	1,987	78.9
Production and inspection	249	1	.3	.1	4	.2
Other	3,325	60	4.3	3.3	88	3.5
No report	2,057	30	2.6	1.6	101	4.0

[1] Those included in the National Register of Scientific and Technical Personnel.

[2] May not add to 100 percent because of rounding.

[3] Exhibit.

Source: National Science Foundation, National Register of Scientific and Technical Personnel, 1964 and 1966.

TABLE VIII-3.—*Scientists*[1] *employed as teachers in all colleges and universities, and in junior colleges, by highest degree held and academic rank: 1964*

A. ALL COLLEGES AND UNIVERSITIES

Highest degree	Total	Academic rank									No report of academic rank
		Dean	Professor	Associate professor	Assistant professor	Instructor	Lecturer	Research associate	Research assistant	Other	
Total	49,595	145	13,086	10,381	11,343	4,183	700	235	3,367	1,337	4,809
Ph. D	32,776	118	11,492	8,433	8,078	882	401	145	123	224	2,880
Professional medical	2,039	1	664	484	410	123	4	49	37	10	257
Master's	11,035	26	752	1,336	2,599	2,657	256	28	1,664	474	1,243
Bachelor's	3,572		124	98	222	508	45	11	1,534	624	406
Less than bachelor's	16		3	1	2	2			3	1	4
No report	157	1	51	29	32	11	3	2	6	4	19

B. JUNIOR COLLEGES

Highest degree	Total	Dean	Professor	Associate professor	Assistant professor	Instructor	Lecturer	Research associate	Research assistant	Other	No report of academic rank
Total	1,665	10	210	206	267	525	18	1	15	52	361
Ph. D	428	3	116	104	81	49	7	1	1	4	62
Professional medical	3		2								1
Master's	1,093	7	82	96	171	406	7		8	41	275
Bachelor's	138		9	6	15	70	4		6	7	21
Less than bachelor's	1										1
No report	2		1								1

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[1] Those included in the National Register of Scientific and Technical Personnel.

Source: National Science Foundation, *National Register of Scientific and Technical Personnel*, 1964 and 1966.

TABLE VIII-4.—*Scientists*[1] *employed in all colleges and universities, and in junior colleges, by field of employment, 1964; and in junior colleges, 1966*

Field	1964				1966	
	Number		Percent[2]		Junior colleges	
	All	Junior colleges	All	Junior colleges	Number	Percent[2]
Total	77,727	1,825	100.0	100.0	2,518	100.0
Chemistry	13,616	266	17.5	14.6	370	14.7
Earth sciences	4,023	111	5.2	6.1	168	6.7
Meteorology	527	9	.7	.5	10	.4
Physics	11,611	293	14.9	16.1	388	15.4
Mathematics	7,206	271	9.3	14.8	364	14.5
Agricultural sciences	2,833	33	3.6	1.8	33	1.3
Biological sciences	15,872	253	20.4	13.9	335	13.3
Psychology	8,162	199	10.5	10.9	284	11.3
Statistics	778	7	1.0	.4	10	.4
Economics	5,061	102	6.5	5.6	134	5.3
Sociology	2,080	50	2.7	2.7	77	3.1
Linguistics	930	14	1.2	.8	6	.2
Other fields	5,028	217	6.5	11.9	339	13.5

[1] Those included in the National Register of Scientific and Technical Personnel.
[2] May not add to 100.0 percent because of rounding.

Source: National Science Foundation, *National Register of Scientific and Technical Personnel*, 1964 and 1966

TABLE VIII-5.—*Scientists*[1] *employed in all colleges and universities, and in junior colleges receiving Federal support, by type of program, 1964; and in junior colleges, 1966*

Program	1964				1966	
	Number		Percent[2]		Junior colleges	
	All	Junior colleges	All	Junior colleges	Number	Percent[2]
Total	77,727	1,825	100.0	100.0	2,518	100.0
Number receiving support[3]	37,915	341	48.8	18.7	624	24.8
Agriculture	5,275	19	6.8	1.0	24	1.0
Atomic energy	5,259	13	6.8	.7	20	.8
Defense	4,896	21	6.3	1.2	38	1.5
Education	7,117	187	9.2	10.2	391	15.5
Health	12,797	49	16.5	2.7	84	3.3
International	556	2	.7	.1	5	.2
Natural resources	1,138	13	1.5	.7	21	.8
Public works	144	1	.2	.1	4	.2
Space	2,374	17	3.1	.9	30	1.2
Other	5,293	64	6.8	3.5	87	3.5
No support	33,101	1,352	42.6	74.1	1,644	65.3
Support unknown	3,142	72	4.0	3.9	141	5.6
No report	3,567	60	4.6	3.3	109	4.3

[1] Those included in the National Register of Scientific and Technical Personnel.
[2] May not add to 100 percent because of rounding.
[3] Less than sum of components because some scientists received support from more than 1 program.

Source: National Science Foundation, *National Register of Scientific and Technical Personnel*, 1964 and 1966.

TABLE VIII-6.—*Age of scientists*[1] *employed in all colleges and universities, and in junior colleges, 1964; and in junior colleges, 1966*

Age	1964				1966	
	Number		Percent[2]		Junior colleges	
	All	Junior colleges	All	Junior colleges	Number	Percent[2]
Total	77,727	1,825	100.0	100.0	2,518	100.0
20 to 24	3.844	22	4.9	1.2	37	1.5
25 to 29	13,043	187	16.8	10.2	300	11.9
30 to 34	14,152	329	18.2	18.0	459	18.2
35 to 39	13,017	330	16.7	18.1	457	18.1
40 to 44	11,229	293	14.4	16.1	388	15.4
45 to 49	7,796	207	10.0	11.3	294	11.7
50 to 54	5,626	182	7.2	10.0	223	8.9
55 to 59	4,236	153	5.4	8.4	175	6.9
60 to 64	2,917	69	3.8	3.8	119	4.7
65 to 69	1,367	38	1.8	2.1	52	2.1
70 and over	369	11	.5	.6	11	.4
No report	124	4	.2	.2	3	.1

[1] Those included in the National Register of Scientific and Technical Personnel.
[2] May not add to 100.0 percent because of rounding.

Source: National Science Foundation, *National Register of Scientific and Technical Personnel*, 1964 and 1966.

TABLE VIII-7—*Scientists*[1] *employed in all colleges and universities, and in junior colleges, by years of experience (in teaching, scientific, or technical work), 1964; and in junior colleges, 1966.*

Years of experience	1964				1966	
	Number		Percent[2]		Junior colleges	
	All	Junior colleges	All	Junior colleges	Number	Percent[2]
Total	77,727	1,825	100.0	100.0	2,518	100.0
1	3,484	34	4.5	1.9	61	2.4
2 to 4	15,154	242	19.5	13.3	328	13.0
5 to 9	16,324	451	21.0	24.7	614	24.4
10 to 14	13,030	338	16.8	18.5	429	17.0
15 to 19	8,075	234	10.4	12.8	406	16.1
20 or more	16,833	472	21.6	25.9	626	24.9
No report	4,827	54	6.2	3.0	54	2.1

[1] Those included in the National Register of Scientific and Technical Personnel.
[2] May not add to 100 percent because of rounding.

Source: National Science Foundation, *National Register of Scientific and Technical Personnel*, 1964 and 1966.

TABLE VIII-8.—*Women scientists*[1] *employed in all colleges and universities, and in junior colleges, by field of employment, 1964; and in junior colleges, 1966*

Field	1964				1966	
	Number		Percent[2]		Junior colleges	
	All	Junior colleges	All	Junior colleges	Number	Percent[2]
Total	8,378	225	100.0	100.0	322	100.0
Chemistry	1,485	40	17.7	17.7	56	17.4
Earth sciences	210	5	2.5	2.2	13	4.0
Physics	22	14	.3	6.2	16	5.0
Meteorology	419	----------	5.0	----------	----------	----------
Mathematics	940	32	11.2	14.2	58	18.0
Agricultural sciences	16	----------	.2	----------	----------	----------
Biological sciences	2,075	40	24.8	17.7	53	16.5
Psychology	1,733	49	20.7	21.7	66	20.5
Statistics	68	----------	.8	----------	3	.9
Economics	222	10	2.6	4.4	6	1.9
Sociology	284	5	3.4	2.2	10	3.1
Linguistics	157	2	1.9	.9	5	1.6
Other fields	747	28	8.9	12.4	36	11.2

[1] Those included in the National Register of Scientific and Technical Personnel.

[2] May not add to 100.0 percent because of rounding.

Source: National Science Foundation, *National Register of Scientific and Technical Personnel*, 1964 and 1966.

TABLE VIII-9.—*Scientists*[1] *employed in all colleges and universities, and in junior colleges, by State, 1964; and in junior colleges, 1966*

State	1964				1966	
	Number		Percent[2]		Junior colleges	
	All	Junior colleges	All	Junior colleges	Number	Percent[2]
Total	77,727	1,825	100.0	100.0	2,518	100.0
Alabama	576	5	.7	.3	2	.1
Alaska	98	1	.1	.1	----------	----------
Arizona	810	23	1.0	1.3	16	.6
Arkansas	381	5	.5	.3	4	.2
California	8,966	586	11.5	32.1	784	31.1
Canal Zone	----------	----------	----------	----------	1	(3)
Colorado	1,099	25	1.4	1.4	54	2.1
Connecticut	1,404	17	1.8	.9	7	.3
Delaware	205	2	.3	.1	5	.2
District of Columbia	639	----------	.8	----------	1	(3)
Florida	1,597	65	2.1	3.6	134	5.3
Georgia	984	27	1.3	1.5	57	2.3
Hawaii	324	1	.4	.1	----------	----------
Idaho	288	22	.4	1.2	27	1.1
Illinois	4,978	61	6.4	3.3	78	3.1
Indiana	2,392	22	3.1	1.2	110	4.4
Iowa	1,653	20	2.1	1.1	24	1.0
Kansas	1,121	22	1.4	1.2	28	1.1
Kentucky	716	5	.9	.3	8	.3
Louisiana	973	----------	1.3	----------	----------	----------
Maine	273	1	.4	.1	1	(3)
Maryland	1,542	28	2.0	1.5	24	1.0
Massachusetts	3,944	41	5.1	2.2	67	2.7
Michigan	3,311	116	4.3	6.4	138	5.5
Minnesota	1,636	25	2.1	1.4	17	.7
Mississippi	360	21	.5	1.2	18	.7
Missouri	1,446	35	1.9	1.9	40	1.6
Montana	283	2	.4	.1	3	.1
Nebraska	596	11	.8	.6	6	.2
Nevada	152	----------	.2	----------	----------	----------
New Hampshire	409	5	.5	.3	7	.3
New Jersey	1,884	15	2.4	.8	14	.6
New Mexico	880	1	1.1	.1	4	.2

See footnotes at end of table, p. 63.

TABLE VIII-9.—*Scientists*[1] *employed in all colleges and universities, and in junior colleges, by State, 1964; and in junior colleges, 1966*—Continued

State	1964				1966	
	Number		Percent[2]		Junior colleges	
	All	Junior colleges	All	Junior colleges	Number	Percent[2]
New York	8,375	196	10.8	10.7	321	12.7
North Carolina	1,664	47	2.1	2.6	65	2.6
North Dakota	239	5	.3	.3	7	.3
Ohio	3,131	25	4.0	1.4	18	.7
Oklahoma	803	19	1.0	1.0	23	.9
Oregon	1,119	19	1.4	1.0	17	.7
Pennsylvania	4,394	28	5.7	1.5	32	1.3
Puerto Rico	173	----------	.2	----------	5	.2
South Carolina	473	5	.6	.3	3	.1
South Dakota	267	3	.3	.2	2	.1
Tennessee	983	3	1.3	.2	5	.2
Texas	2,610	92	3.4	5.0	127	5.0
Utah	661	5	.9	.3	2	.1
Vermont	226	3	.3	.2	10	.4
Virginia	1,101	56	1.4	3.1	81	3.2
Washington	1,555	66	2.0	3.6	83	3.3
West Virginia	392	2	.5	.1	3	.1
Wisconsin	2,199	18	2.8	1.0	12	.5
Wyoming	189	13	.2	.7	18	.7
Foreign	747	7	1.0	.4	----------	----------

[1] Those included in the "National Register of Scientific and Technical Personnel."

[2] May not add to 100 percent because of rounding.

[3] Less than 0.05 percent.

Source: National Science Foundation, *National Register of Scientific and Technical Personnel*, 1964 and 1966.

IX. JUNIOR COLLEGE SCIENCE FACULTY, SPRING 1966

Under a grant arrangement, the National Science Foundation has on two occasions supported the American Association of Junior Colleges in establishing a registry of junior college science and mathematics teachers. The first was for the fall of the 1963–64 academic year and the most recent, for the spring of the 1965–66 academic year. The data for the most recent registry have been "mined" in order to provide data for an analysis of selected characteristics of junior college science faculty.

These characteristics include employment status (i.e., full time or part time), degree of specialization (i.e., whether teaching in one, or more than one, science field), educational attainment (in terms of level and area of degree), and the science field to which assigned. "Science" is here broadly used to include the social sciences, mathematics, engineering, and technology. Finally, data are presented on the field distribution of teachers within junior colleges classified on the basis of control (private and public), of enrollment size (in terms of four class intervals: 2,500 and up, 1,000 to 2,499, 500 to 999, and below 500), and of program ("transfer only" and "all other").

The discussion is in terms of the 709 institutions (table IX–1, p. 65) that responded to requests for information—or 92.1 percent of the junior colleges listed in the *1966 Junior College Directory* of the AAJC No attempt has been made to make estimates for nonresponding institutions, or qualitatively to assess the nature of nonresponse.

Almost two-fifths (37.1 percent) of the junior colleges had fewer than 500 students (table IX–2, p. 66). Almost three-quarters (71.1 percent) of the private schools were in this category. The public schools, on the other hand, were about equally distributed among the four enrollment-size categories. About seven-tenths of all schools were public. One-fifth (21 percent) of the schools were "transfer-only" schools, that is, those specializing in preparing lower division students for transfer to 4-year institutions. Fewer than one in 10 of the public institutions were of this "feeder" type.

The junior colleges participating in the registry reported 12,700 "specialist" teachers (table IX–3, p. 66), that is, those assigned to teach in one science field only, and 1,500 teachers who taught in more than one science field, making a total of 14,200.[48] A great preponderance of science teachers are full-time employees of their institutions, almost eight out of 10 of the specialists falling in this category, and almost nine out of 10 of the nonspecialists.

There are great variations in the incidence of nonspecialists among the several science fields (table IX–4, p. 67). In the behavioral sciences, more than one-half (51.1 percent) of the anthropology teachers are nonspecialists and more than one-third (35.3 percent) of the sociology teachers. At the other extreme, fewer than one out of 10 of the teachers in agriculture and in the biological sciences are nonspecialists. Among the natural sciences, nonspecialists abound in physics (43.4 percent) and in the earth sciences (35.8 percent). About one in five of the chemistry and of the mathematics teachers are nonspecialists. The percentages for engineering and for technology teachers are 36.4 percent and 13.7 percent, respectively.

The remainder of the discussion in this section is couched in terms of the specialist science teachers. If mathematics is included among them, the natural sciences account for more than one in three (35 percent) of all science teachers who teach in one science field only. Mathematics teachers alone make up almost one-fifth (18.3 percent) of the total. More than one out of four (26.5 percent) are in the behavioral sciences; about one out of seven in both technology (14.5 percent) and the biological sciences (14.9 percent). Engineering and agriculture trail with 4.5 percent and 1.7 percent, respectively.

In terms of academic attainment, most junior college science teachers (70.5 percent) hold the master's degree. Fewer than one in 10 have the doctorate, and about one in seven are baccalaureates only (tables IX–5 and IX–6, pp. 67, 68). In terms of highest degree held, about nine in 10 (87.6 percent) have degrees in a subject matter field, as contrasted with, or other than, "education" or "administration." About two-thirds (65.4 percent) of the doctorates fall into this category; about seven-tenths of the master's (69.6 percent); and about three-quarters of the baccalaureates (74 percent).

There are significant differences in the distribution by field of science teachers in public as contrasted with private institutions (table IX–7, p. 68). One-third (33.6 percent) of those in private institutions are in the behavioral sciences, only one-quarter (25.3 percent) of those in public institutions. Especially in economics and in psychology, among the behavioral sciences, are private junior college teachers more numerous. On the other hand, relatively twice as many public school, as private school, teachers are in technology—or, respectively, 15.5 percent and 8.5 percent. We find 35.6 percent of the public, and 31.3 percent of the private, junior college teachers in the natural sciences. The percentages in chemistry are identical (9.1 percent), while the scale is tipped somewhat in favor of the public institutions in physics, the earth sciences, and mathematics.

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[48] The American Association of Junior Colleges, in *1966 Junior College Directory* reports 60,500 teachers for instruction and administration in 1964–65.

When junior colleges are classified on the basis of program ("transfer only" and "all other"), we find that 22.2 percent of the science teachers in "all other" schools are in the three fields of technology, engineering, and agriculture—while only 7.3 percent of those in "transfer only" schools are in these fields (table IX-8, p. 69). In all other fields except physics and the earth sciences (where the differences are minor), the percentages are greater for the transfer-only schools.

The picture which emerges when junior colleges are classified on the basis of enrollment size is what one would expect, and supports what has been pointed out above (table IX-9, p. 69). The relative emphasis, in terms of staff, on the natural sciences and the biological sciences is fairly equal among all four class intervals. There is, however, a greater emphasis on technology in the larger (and predominantly public) schools. The accent in the smaller (and predominantly private) schools, on the other hand, is relatively greater on the behavioral sciences.

TABLE IX-1.—*Number of junior colleges represented in the National Registry of Junior College Science and Mathematics Teachers, Spring 1966, by control, by program, and by enrollment size*

Control and program (1)	Total (2)	2,500 and up (3)	1,000 to 2,499 (4)	500 to 999 (5)	Below 500 (6)
Total	709	136	150	160	263
Transfer only	149	7	11	16	115
All other	560	129	139	144	148
Private	218	6	19	38	155
Transfer only	104	1	4	10	89
All other	114	5	15	28	66
Public	491	130	131	122	108
Transfer only	45	6	7	6	26
All other	446	124	124	116	82

Source: National Science Foundation; based on data in American Association of Junior Colleges Registry of Junior College Science and Mathematics Teachers, spring 1966.

Table IX–2.—*Percent[1] of junior colleges represented in the National Registry of Junior College Science and Mathematics Teachers, Spring 1966, by control, by program, and by enrollment size*

Control and program (1)	Total (2)	2,500 and up (3)	1,000 to 2,499 (4)	500 to 999 (5)	Below 500 (6)
Total	100.0	100.0	100.0	100.0	100.0
Transfer only	21.0	5.1	7.3	10.0	43.7
All other	79.0	94.9	92.7	90.0	56.3
Private	30.7	4.4	12.7	23.8	58.9
Transfer only	14.7	0.7	2.7	6.3	33.8
All other	16.1	3.7	10.0	17.5	25.1
Public	69.3	95.6	87.3	76.3	41.1
Transfer only	6.3	4.4	4.7	3.8	9.9
All other	62.9	91.2	82.7	72.5	31.2
Total	100.0	19.2	21.2	22.6	37.1
Transfer only	100.0	4.7	7.4	10.7	77.2
All other	100.0	23.0	24.8	25.7	26.4
Private	100.0	2.8	8.7	17.4	71.1
Transfer only	100.0	1.0	3.9	9.6	85.6
All other	100.0	4.4	13.2	24.6	57.9
Public	100.0	26.5	26.7	24.8	22.0
Transfer only	100.0	13.3	15.6	13.3	57.8
All other	100.0	27.8	27.8	26.0	18.4

[1] Detail may not add to total because of rounding.

Source: National Science Foundation; based on data in American Association of Junior Colleges Registry of Junior College Science and Mathematics Teachers, spring 1966.

Table IX–3.—*Number of junior college teachers who teach in 1 science field only and who teach in more than 1 science field, by field and by employment status: Spring 1966*

Field	Teach 1 science field only				Teach more than 1 science field[1]			
	Total	Full-time	Part-time	Nonresponse	Total	Full-time	Part-time	Nonresponse
Total	12,678	9,960	2,371	347	[2] 1,518	[2] 1,342	[2] 131	[2] 45
Chemistry	1,153	991	131	31	324	285	30	9
Physics	591	496	82	13	453	407	34	12
Earth sciences	373	302	67	4	208	187	15	6
Mathematics	2,320	1,812	453	55	527	476	33	18
Engineering	565	402	148	15	323	291	18	14
Technology	1,838	1,431	355	52	292	266	23	3
Agriculture	218	182	25	11	21	20	0	1
Biological sciences	1,891	1,627	219	45	191	164	21	6
Anthropology	88	74	14	0	92	79	10	3
Sociology	562	398	150	14	307	261	38	8
Psychology	1,217	792	405	20	191	161	26	4
Economics	653	505	125	23	91	79	9	3
Political science	839	688	126	25	164	143	16	5
No field indicated	370	260	71	39	-------	-------	-------	-------

[1] These figures contain duplicate counts between fields because each individual is counted in at least one other field. For any single field, this total may be added to the "Teach only 1 subject" total to obtain a total count of teachers in a given field.

[2] Unduplicated count.

Source: National Science Foundation; based on data in American Association of Junior Colleges Registry of Junior College Science and Mathematics Teachers, spring 1966.

TABLE IX-4.—*Total number of junior college science teachers, by field; and relationships of those who teach in more than 1 science field to the total, by field: Spring 1966*

Field	Number			Percent [1]	
	Total	Teach 1 science field only	Teach more than 1 science field [2]	Teach 1 science field only (col. 3)	Nonspecialists col. 4/col. 2
(1)	(2)	(3)	(4)	(5)	(6)
Total	[3] 14,196	12,678	[3] 1,518	100.0	10.7
Natural sciences		4,437		35.0	
Chemistry	1,477	1,153	324	9.1	21.9
Physics	1,044	591	453	4.7	43.4
Earth sciences	581	375	208	2.9	35.8
Mathematics	2,847	2,320	527	18.3	18.5
Engineering	888	565	323	4.5	36.4
Technology	2,130	1,838	292	14.5	13.7
Agriculture	239	218	21	1.7	8.8
Biological sciences	2,082	1,891	191	14.9	9.2
Behavioral sciences		3,359		26.5	
Anthropology	180	88	92	.7	51.1
Sociology	869	562	307	4.4	35.3
Psychology	1,408	1,217	191	9.6	13.6
Economics	744	653	91	5.2	12.2
Political science	1,003	839	164	6.6	16.4
No field indicated	370	370		2.9	

[1] Detail may not add to total because of rounding.

[2] These figures contain duplicate counts between fields because each individual is counted in at least 1 other field. For any single field, this total may be added to the "Teach only 1 subject" total to obtain a total count of teachers in a given field.

[3] Unduplicated count.

Source: National Science Foundation; based on data in American Association of Junior Colleges Registry of Junior College Science and Mathematics Teachers, spring 1966.

TABLE IX-5.—*Number of junior college science teachers who teach in 1 science field only, by level of degree, by broad area of degree, and by employment status: Spring 1966.*

Degree	Total	Full time	Part time	Nonresponse
Total	12,678	9,961	2,359	358
Bachelor's degree in	1,845	1,298	502	45
Subject matter field	1,365	1,014	337	14
Education or administration	102	64	36	2
Intermediate	378	220	129	29
Master's degree in	8,939	7,396	1,399	144
Subject matter field	6,219	5,222	894	103
Education or administration	914	690	186	38
Intermediate	1,806	1,484	319	3
Doctor's degree in	1,175	833	300	42
Subject matter field	769	553	203	13
Education or administration	166	106	43	17
Intermediate	240	174	54	12
No degree	434	259	65	110
No response	285	175	93	17

Source: National Science Foundation; based on data in American Association of Junior Colleges Registry of Junior College Science & Mathematics Teachers, spring 1966.

Table IX–6.—*Percent*[1] *of junior college science teachers who teach in 1 science field only, by level of degree, by broad area of degree, and by employment status: Spring 1966*

Degree (1)	Total (part time and full time) (2)	(3)	Full time (4)	(5)	Percent, part time of total (6)
Total	100.0	----------	100.0	----------	18.6
Bachelor's degree	14.6	100.0	13.0	100.0	27.2
Subject matter field	10.8	74.0	10.2	78.1	24.7
Education or administration	.8	5.5	.6	4.9	35.3
Intermediate	3.0	20.5	2.2	16.9	34.1
Master's degree	70.5	100.0	74.2	100.0	15.7
Subject matter field	49.0	69.6	52.4	70.6	14.4
Education or administration	7.2	10.2	6.9	9.3	20.4
Intermediate	14.2	20.2	14.9	20.1	17.7
Doctor's degree	9.3	100.0	8.4	100.0	25.5
Subject matter field	6.1	65.4	5.6	66.4	26.4
Education or administration	1.3	14.1	1.1	12.7	25.9
Intermediate	1.9	20.4	1.7	20.9	22.5
No degree	3.4	----------	2.6	----------	----------
No response	2.2	----------	1.3	----------	----------

[1] Detail may not add to total because of rounding.

Source: National Science Foundation; based on data in American Association of Junior Colleges Registry of Junior College Science and Mathematics Teachers, spring 1966.

Table IX–7.—*Number and percent of junior college science teachers who teach in 1 science field only, by field and by control of institution: Spring 1966*

Field (1)	Public		Private	
	Number (2)	Percent[1] (3)	Number (4)	Percent[1] (5)
Total	10,900	100.0	1,778	100.0
Natural sciences	3,880	35.6	557	31.3
Chemistry	991	9.1	162	9.1
Physics	534	4.9	57	3.2
Earth sciences	346	3.2	27	1.5
Mathematics	2,009	18.4	311	17.5
Engineering	458	4.2	107	6.0
Technology	1,686	15.5	152	8.5
Agriculture	211	1.9	7	.4
Biological sciences	1,575	14.4	316	17.8
Behavioral sciences	2,761	25.3	598	33.6
Anthropology	82	.8	6	.3
Sociology	460	4.2	102	5.7
Psychology	986	9.0	231	13.0
Economics	524	4.8	129	7.3
Political science	709	6.5	130	7.3
No field indicated	329	3.0	41	2.3

[1] Detail may not add to total because of rounding.

Source: National Science Foundation; based on data in American Association of Junior Colleges Registry of Junior College Science and Mathematics Teachers, Spring 1966.

TABLE IX–8.—*Number and percent of junior college science teachers who teach in 1 science field only, by field and by program: Spring 1966*

Field	Transfer only		All other	
	Number	Percent [1]	Number	Percent [1]
(1)	(2)	(3)	(4)	(5)
Total	1,233	100.0	11,445	100.0
Natural sciences	469	38.0	3,968	34.7
Chemistry	122	9.9	1,031	9.0
Physics	56	4.5	535	4.7
Earth sciences	34	2.8	339	3.0
Mathematics	257	20.8	2,063	18.0
Engineering	41	3.3	524	4.6
Technology	45	3.6	1,793	15.7
Agriculture	5	.4	213	1.9
Biological sciences	245	19.9	1,646	14.4
Behavorial sciences	394	32.0	2,965	25.9
Anthropology	12	1.0	76	.7
Sociology	74	6.0	488	4.3
Psychology	134	10.9	1,083	9.5
Economics	76	6.2	577	5.0
Political science	98	7.9	741	6.5
No field indicated	34	2.8	336	2.9

[1] Data may not add to total because of rounding.

Source: National Science Foundation; based on data in American Association of Junior Colleges Registry of Junior College Science and Mathematics Teachers, spring 1966.

TABLE IX–9.—*Number and percent of junior college science teachers who teach in 1 science field only, by field and by enrollment size of college: Spring 1966*

Field	2,500 and up		1,000–2,499		500–999		Below 500	
	Number	Percent [1]	Number	Percent [1]	Number	Percent [1]	Number	Percent [1]
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Total	6,231	100.0	3,044	100.0	1,804	100.0	1,599	100.0
Natural sciences	2,302	36.9	1,023	33.6	580	32.2	532	33.3
Chemistry	582	9.3	267	8.8	162	9.0	142	8.9
Physics	336	5.4	116	3.8	74	4.1	65	4.1
Earth sciences	207	3.3	92	3.0	41	2.3	33	2.1
Mathematics	1,177	18.9	548	18.0	303	16.8	292	18.3
Engineering	320	5.1	122	4.0	61	3.4	62	3.9
Technology	999	16.0	502	16.5	191	10.6	146	9.1
Agriculture	67	1.1	108	3.5	33	1.8	10	.6
Biological sciences	885	14.2	447	14.7	300	16.2	259	16.2
Behavioral sciences	1,544	24.8	728	23.9	583	32.3	504	31.5
Anthropology	59	.9	13	.4	8	.4	8	.5
Sociology	254	4.1	119	3.9	99	5.5	90	5.6
Psychology	597	9.6	253	8.3	184	10.2	183	11.4
Economics	241	3.9	169	5.6	132	7.3	111	6.9
Political science	393	6.3	174	5.7	160	8.9	112	7.0
No field indicated	114	1.8	114	3.7	56	3.1	86	5.4

[1] Detail may not add to total because of rounding.

Source: National Science Foundation; based on data in American Association of Junior Colleges Registry of Junior College Science & Mathematics Teachers, Spring 1966.

X. Newly Hired Junior College Science Faculty

In some fields the faculty shortage is less severe for junior colleges than for 4-year institutions. Just as the 4-year institution turns to the 2-year institution as a source of supply, so also the 2-year institution turns to the high school; and, at this latter level, the potential supply, relative to demand, is much greater. Hence, the stringency in supply of personnel is generally most severe for the junior college in those fields in which high school teachers are in short supply, mathematics and the physical sciences being prominent among them. Junior college administrators have no alternative but to respond to shortage situations by hiring less-qualified personnel.

In a recent study of junior college staff newly hired in 1964–65,[49] an attempt was made to categorize disciplines as either "shortage" or "surplus" by considering four variables as being indicative of causes or signs of such conditions: salaries paid to newly hired instructors, percentage of instructors voluntarily leaving their last higher educational post, percentage of vacancies left unfilled, and, finally, percentage of vacancies resulting from expansion. The shortage fields, in order of severity, were found to be: the physical sciences, mathematics, engineering, business education, psychology, religion-philosophy-law, and vocational subjects; the surplus fields: physical education, business, the biological sciences, English, foreign languages, the social sciences, fine arts, and history.

Table X–1 (p. 72) gives some indication of the manner in which junior college recruitment accommodates to the realities of shortage situations. The percentages of faculty newly hired by 2-year and by 4-year institutions who held doctorates are presented for those shortage and surplus areas for which statistically significant comparable data are available. Among the shortage fields, the greatest measure of "compromise" is in evidence in engineering and in mathematics. Not one doctorate was found among the engineers newly hired by junior colleges in 1964–65; about two-thirds of the engineers newly hired by 4-year institutions held doctorates. In mathematics the corresponding figures are less than one-fortieth for junior colleges and more than 40 percent for 4-year institutions. The physical sciences and psychology (mainly counseling and guidance) fare considerably better, with a considerable differential in evidence, nonetheless. A considerable differential is also present in the surplus fields of the biological and social sciences. The incidence of doctorates among new hires in the biological sciences was 6.5 percent and 62.6 percent for the 2-year and 4-year institutions, respectively; and for the social sciences, 5.6 percent and 50.3 percent.

The rest of the discussion on newly hired faculty is concerned with the totality of such faculty: i.e., without regard specifically to disciplines (except to the extent that the discussion relating to research participation may have more relevance for the science than the nonscience areas). This is not to say that it does not have relevance for the conduct of science education in the 2-year institution.

To a greater extent than in 4-year institutions, the recruiting of faculty in junior colleges is vested in the president or dean rather than in the department chairman. Table X–2 (p. 72) shows that the departmental chairman at the 4-year institution acted as recruiter in more than two-thirds of the cases; the corresponding official at the 2-year institution, in fewer than one-third of the cases. Even in the larger junior colleges, the responsibility for recruitment was delegated to the department chairman in 46 percent of the cases (in the smaller junior colleges, 22 percent of the cases).

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[49] Much of the ensuing data on newly hired junior faculty teachers are obtained from David G. Brown, *The Instructor Exchange: Staffing Junior Colleges* (Raleigh, N.C.: North Carolina State University, August 1966). "Newly hired" means new to a given campus during the year of the study.

A significant proportion of junior college teachers are recruited from high schools, almost two-fifths of those newly hired in 1964–65 having had high school experience, as seen in table X–3 (p. 72). The 4-year institution is more likely than the 2-year to recruit well-trained, inexperienced graduate students when experienced college personnel are not available. The junior college is more likely to turn to the reservoir of experienced high school teachers as a source of supply.

The onerous task which confronts the recruiter of junior college personnel is only too obvious in the data presented in table X–4 (p. 73). About 25 percent of all junior college professors were new to their particular campuses in 1964–65. Not surprisingly, the "accession" rate for public 2-year schools is somewhat higher, as is that for the southeastern region of the country.

As would be expected, the junior college sector of the higher educational universe is less able to retain staff than is the 4-year college sector or the university sector. This, of course, is a major reason for the size of the recruiting task annually confronting junior college administrators. Of the staff newly hired by universities in 1964–65, 65 percent had been on the campuses of other universities during the previous academic year. The corresponding figures for the 4-year college sector and the junior college sector are 54 percent and 29 percent, respectively (table X–5, p. 73). The junior college sector in 1964–65 was successful in attracting only 5 percent of 4-year college faculty who made a change, and only 2 percent of university faculty making a change.

From the outset, the newly hired junior college staff of 1964–65 had little expectation of remaining on the same campus (and, possibly, on any other junior college campus) for very long. Almost half of them expect to leave the campus within 3 years (table X–6, p. 73).

The most popular reason for leaving a given institution of higher education, given by 29 percent of the respondents (table X–7, p. 73) was inadequacy of salary. Twenty-two percent felt that "administration or administrators [were] not competent." Of particular relevance to the teaching of science was the large number (14 percent) which felt that teaching hours were excessive, and that research facilities and opportunities were poor (10 percent).

Among the many factors which conduce to the differential attractiveness of the 4-year institution over the junior college are teaching load and opportunities to do research (and to associate with research-oriented colleagues). Table X–8 (p. 74) shows that the teaching load of the newly hired professor in the 2-year college was 15 hours, contrasted with 12 hours for his opposite number in the 4-year institution. Twenty-two percent of the former claim to have published, and only 2 percent state that they spend a majority of their time at research and writing. The corresponding figures for the colleague at the 4-year institution are 45 and 9 percent.

In spite of the considerable obstacles which confront junior colleges in recruiting and retaining staff, the quality of staff (in terms of educational attainment) has improved. Among newly hired staff in 1964–65, almost 11 percent held the doctorate (table X–9, p. 74), and about three-quarters held the master's. Sporadic studies from 1918–19 to 1958–59 have shown a steady secular increase in doctorates and master's degrees and a corresponding decline in bachelor's.

TABLE X–1.—*Percentage of newly hired faculty in 2- and 4-year institutions holding the doctorate, by shortage and surplus field, 1964–65*

	2-year institution	4-year institution
Shortage fields: [1]		
Psychology	15.0	72.9
Physical sciences	12.5	68.9
Mathematics	2.4	42.8
Engineering	0	65.7
Surplus fields: [1]		
Education	28.0	47.4
History	7.7	55.0
Biological sciences	6.5	62.6
Social sciences	5.6	50.3
Fine arts	5.6	12.3
Foreign languages	5.0	35.0
English	3.3	29.0

[1] Variables used as being indicative of causes and signs of shortage and surplus were mean salary paid to newly hired instructors, percentage of instructors leaving last higher educational teaching post voluntarily, percentage of unfilled vacancies, and percentage of vacancies resulting from expansion.

Source: David G. Brown, *The Instructor Exchange*, p. 32.

TABLE X–2.—*Position of recruiter of faculty newly hired in 1964–65*

[In percent]

Position	Small 2-year colleges [1]	Large 2-year colleges [2]	All 2-year colleges	All 4-year colleges
President	36	16	28	8
Dean and division chairman	42	38	40	23
Department chairman	22	46	32	69
Total	100	100	100	100

[1] Having fewer than 1,000 students.
[2] Having 1,000 or more students.

Source: David G. Brown, *The Instructor Exchange*, p. 6.

TABLE X–3.—*Teaching experience of newly hired teachers recruited from outside higher education, 1964–65*

[In percent]

	2-year institution	4-year institution
Experience of newly hired faculty:		
Experienced (employed as secondary school teachers in 1963–64)	37	18
Inexperienced (employed in business, government, foundations or unemployed in 1963–64)	63	82
Total	100	100

Source: David G. Brown, *The Student Exchange*, p. 27.

TABLE X–4.—*Accession rates for newly hired faculty, 1964–65*

Characteristics of school:	*Accession rate (percent)*	
All 2-year colleges	21.8	([1] 25.1)
All 4-year colleges	17.7	
2-year public	22.2	([1] 26.1)
2-year private	20.2	([1] 21.1)
2-year North Atlantic	19.1	
2-year Midwest and Great Plains	19.0	
2-year Southeast	26.2	
2-year West and Southwest	22.7	

[1] Includes hiring at newly founded schools.

Source: David G. Brown, *The Instructor Exchange*, p. 20.

TABLE X–5.—*Mobility of newly hired higher educational faculty among selected types of institutions, 1964–65*

[In percent]

Level of institution left	Level of new institution			
	Junior college	4-year college	University	Total
Junior college	29	56	15	100
4-year college	5	54	41	100
University	2	33	65	100

Source: David G. Brown, *The Instructor Exchange*, p. 48.

TABLE X–6.—*Anticipated permanency of newly hired junior college faculty, 1964–65*

Expect to remain [1]—	*Percent* [2]
1 year only	12
2 to 3 years	36
4 to 10 years	31
Until retirement	23
Total	100

[1] At junior college at which employed in 1964–65.
[2] Total does not equal 100 due to rounding.

Source: David G. Brown, *The Instructor Exchange*, p. 15.

TABLE X–7.—*Reasons junior college faculty left "unacceptable"* [1] *jobs in higher education, 1964–65*

Reasons	*Percent*
Salary too low	29
Administration or administrators not competent	22
Advancement prospects in academic rank poor	22
Cultural opportunities poor	16
Future salary prospects poor	14
Teaching hours excessive	14
Friends and relatives too far away	13
Climate undesirable	13
Research facilities and opportunities poor	10
Courses assigned undesirable	9
Quality of students poor	7
Reputation of school among scholars poor	5
Colleagues not competent	4
Colleagues not congenial	3
Fringe benefits poor	2
Opportunities for outside income poor	1

[1] The base is all new junior college faculty who came from another IHL in 1963–64, who viewed their previous job as unacceptable, and who answered why it was unacceptable. The base excludes those who felt their previous job to be acceptable and those whose previous job was unavailable. The percentages total more than 100 percent because many persons checked two factors.

Source: David G. Brown, *The Instructor Exchange*, p. 60.

TABLE X–8.—*Work patterns of newly hired faculty in junior colleges and in 4-year institutions, 1964–65*

Work characteristics		2-year institutions	4-year institutions
Average teaching load	hours	15	12
Professors who have published	percent	22	45
Professors who spend a majority of their time at research and writing	do	2	9

Source: David G. Brown, *The Instructor Exchange*, p. 26.

TABLE X–9.—*Highest earned degree of junior college faculty: Selected years (and studies), 1918–19 to 1964–65*

[In percent]

Year of study	Author	Doctorate	Master's	Less than master's	Total [1]
1918–19	McDowell	2.8	39.5	57.8	100
1922–23	Koos	3.0	47.0	50.0	100
1953–54	Colvert and Litton	6.3	67.5	26.2	100
1955–56	Colvert and Baker	7.2	68.5	24.4	100
1958–59	Medsker	9.7	64.6	23.8	100
1964–65	Brown [2]	10.8	75.1	14.1	100

[1] Totals may not equal 100 percent because of rounding.

[2] Newly hired faculty only; i.e., "flow" of faculty as distinguished from "stock." Other data are of latter type.

Source; David G. Brown, *The Instructor Exchange*, p. 24.

XI. New Junior College Science Faculty

This section is concerned with teachers who were new to junior college teaching in the year or years for which data are presented. The source of the basic data are four biennial studies conducted by the National Education Association [50] of the junior college universe of institutions as defined by the American Association of Junior Colleges. A varying but increasing number of institutions responded to requests for data, from a low of 412 junior colleges in the 2-year period 1957–58 and 1958–59 to 566 institutions for the most recent 2-year period, 1963–64 and 1964–65. The response rate for the most recent study was 81.6 percent in terms of institutions.

The objective of these studies has been to obtain data which would permit a description of the junior college situation in terms of sources of new full-time teachers, qualifications (degree level), field distribution, sex distribution, vacancies, and the outlook for the future. To the extent that the basic data permit it, an attempt is made here to present data having particular relevance for education in the sciences.

The high school predominates as a source of junior college teachers (table XI–1, p. 76), 30.3 percent (of 7,100 new teachers) having come from this sector in the 2 academic years ending June 30, 1965. The graduate school (23.7 percent), college or university teaching (17.1 percent), and business occupations (11.3 percent) together accounted for more than half (52.1 percent). The remaining 17.6 percent came from a variety of sources. The rank ordering is different when junior colleges are classified on the basis of control: the most prolific source of supply (27.2 percent) for private junior colleges was the graduate school.

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[50] Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963–64 and 1964–65* (Research Report 1965-R4; Washington, D.C.: National Education Association, 1965), pp. 35–49.

In terms of field, 37.2 percent of the new teachers majored in the broad area of science and engineering (table XI–2, p. 77). The rank ordering, in terms of composite fields and in descending order of numbers, was as follows: social sciences, 10.3 percent; physical sciences, 7.9 percent; mathematics, 7.3 percent; biological sciences, 6 percent; psychology, 3.6 percent; and engineering, 2.3 percent.

In terms of academic attainment, and taking all fields together, there has been little change, on balance, during the period 1957–58 to 1964–65, in the percent of new junior college teachers who held the doctorate or had a year's credit beyond the master's degree (table XI–3, p. 77, and figures XI–1 and XI–2, pp. 78–79). Some increase has occurred in the percentage holding the master's degree, there being an offsetting decline in the percentage at the less-than-master's level.

There is little difference in the academic attainment between new teachers attracted to public junior colleges and those attracted to private junior colleges in most of the major fields of instruction. In some fields, both sectors succeed in attracting a large percentage of new teachers with advanced academic attainment; in other fields both sectors fail in so doing. The variation in academic attainment, from field to field, is quite considerable.

The modal degree for a new junior college teacher being the master's, some measure of stringency in the supply of teachers, by field, can be obtained by comparing the percentages of new teachers with more than, and with less than, respectively, the master's degree for two recent periods. The two periods selected are the sum of the 2 academic years ending June 30, 1963, on the one hand, and the sum of the 2 academic years ending June 30, 1965, on the other (tables XI–4 and XI–5, p. 80).

In biology and in physics, there was an increase in the percentage of new teachers with more than a master's degree. The increase in biology was small and may not be statistically significant; the increase in physics was large, from 24.4 to 30.9 percent. Declines of minor proportions obtained in psychology, in chemistry, and in mathematics; but a decline of some magnitude obtained in engineering (from 12.1 to 6.7 percent).

Declines were also the order of the day at the less-than-master's level in psychology and in chemistry, indicating increased percentages at the master's level in these two fields. The opposite situation prevailed in biology: there was a slight increase both at the upper and lower attainment levels. There were somewhat compensatory changes at the less-than-master's level in mathematics, in physics, and in engineering. The increases in mathematics and, to a lesser extent, in engineering were quite large.

Of greater importance, perhaps, is the wide range of variation in percentages among the several fields (table XI–4, p. 80). Illustratively, and excluding engineering, in which relatively few doctorates are awarded, the range for new teachers having a doctorate or a master's-plus-1-year was from 25.5 percent for mathematics to 46.6 percent for psychology. It would appear, then, that the lower limit of the range for the major science fields under consideration here is about equal to the average for all fields combined.

About three-tenths of new junior college teachers are women. (Almost half and more than five-sixths, respectively, of high school teachers and elementary school teachers are women.) This ratio has remained relatively constant for the last several years (table XI–6, p. 80). Women do, however, play a lesser role in the sciences than in other areas (table XI–7, p. 80). In mathematics, one in five new junior college teachers is a woman; in chemistry, one in eight; and in physics, one in 14.

The fact that women play a lesser role in science than in other fields is only one of the factors contributing to a shortage of science teachers. Some idea of the seriousness of the situation can be obtained from data on unfilled positions, and on the views of junior college officials on the present situation and future prospects.

Table XI–8 (p. 81) shows that 125 junior colleges reported 179 unfilled, full-time budgeted positions. Prominent among the fields mentioned were engineering, physics, and mathematics. The practice of filling all budgeted positions with such candidates as may be available, however, makes it difficult accurately to assess the seriousness of the science teacher shortage from data on unfilled positions.

Table XI–9 (p. 82) presents another view of the situation. Officials in 467 of 566 junior colleges considered the shortage of qualified teachers critical. Mathematics was the field mentioned by the largest number (159). Other science fields prominently mentioned were physics (132), unspecified natural science (109), and chemistry (105). Engineering was mentioned by officials of 69 junior colleges. Table XI–10 (p. 83) presents data on the number of institutions which foresaw a future shortage of qualified teachers. Seemingly, junior college officials pretty much projected the present critical situation into the future.

TABLE XI–1.—*Sources of new full-time junior college teachers employed in 1963–64 and 1964–65*

Source of new teachers	All junior colleges		Public junior colleges		Nonpublic junior colleges	
	Number	Percent	Number	Percent	Number	Percent
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Graduate school	1,681	23.7	1,323	23.0	358	27.2
Bachelor's degree class	262	3.7	170	3.0	92	7.0
College or university teaching	1,208	17.1	995	17.3	213	16.2
High school teaching	2,147	30.3	1,853	32.2	294	22.3
Elementary school teaching	91	1.3	64	1.1	27	2.0
School administration	71	1.0	54	.9	17	1.3
Research (both educational and noneducational)	109	1.5	82	1.4	27	2.0
Other educational service	170	2.4	139	2.4	31	2.3
Homemaking	99	1.4	77	1.3	22	1.7
Religious service	71	1.0	30	.5	41	3.1
Business occupations	800	11.3	646	11.2	154	11.7
Government service (civilian)	139	2.0	124	2.2	15	1.1
Military service	84	1.2	70	1.2	14	1.1
Miscellaneous (noneducational)	146	2.1	133	2.3	13	1.0
All sources	7,078	100.0	5,760	100.0	1,318	100.0
Number of institutions reporting	547	----------	356	----------	191	----------

Source: Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963–64 and 1964–65* (Research rept. 1965–R4, Washington, D.C.: National Education Association, 1965).

TABLE XI-2.—*Percentage distribution by field of new full-time junior college faculty in 1963-64 and 1964-65*

	Percent		Percent
Total	100.0	*Mathematics	7.3
		Vocational education	6.9
(*Science and engineering)	(37.2)	*Biological sciences	6.0
(Nonscience)	(62.8)	Fine arts	5.9
English and journalism	18.2	History	5.5
Business	11.9	Foreign language	5.4
*Social Science	10.3	*Psychology	3.6
Physical education	8.3	*Engineering	2.3
*Physical sciences	7.9	Religion-philosophy-law	.7

Source: Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963-64 and 1964-65* (Research Report 1965-R4; Washington, D.C.: National Education Association, 1965).

* Denotes natural and social sciences.

TABLE XI-3.—*Academic preparation of new junior college teachers: 1957-58 to 1964-65*

[Percent at selected attainment levels]

Year	Doctor's degree	Master's plus 1 year	Master's degree	Master's minus
1957-58	6.2	22.1	43.6	28.1
1958-59	7.9	18.6	45.8	27.7
1959-60	6.6	17.7	47.8	27.9
1960-61	6.1	17.1	48.5	28.3
1961-62	7.0	18.4	53.6	21.0
1962-63	7.2	20.7	51.5	20.6
1963-64	7.3	19.0	49.6	24.1
1964-65	6.2	20.7	51.3	21.8

Source: Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963-64 and 1964-65* (Research Report 1965-R4; Washington, D.C.: National Education Association, 1965).

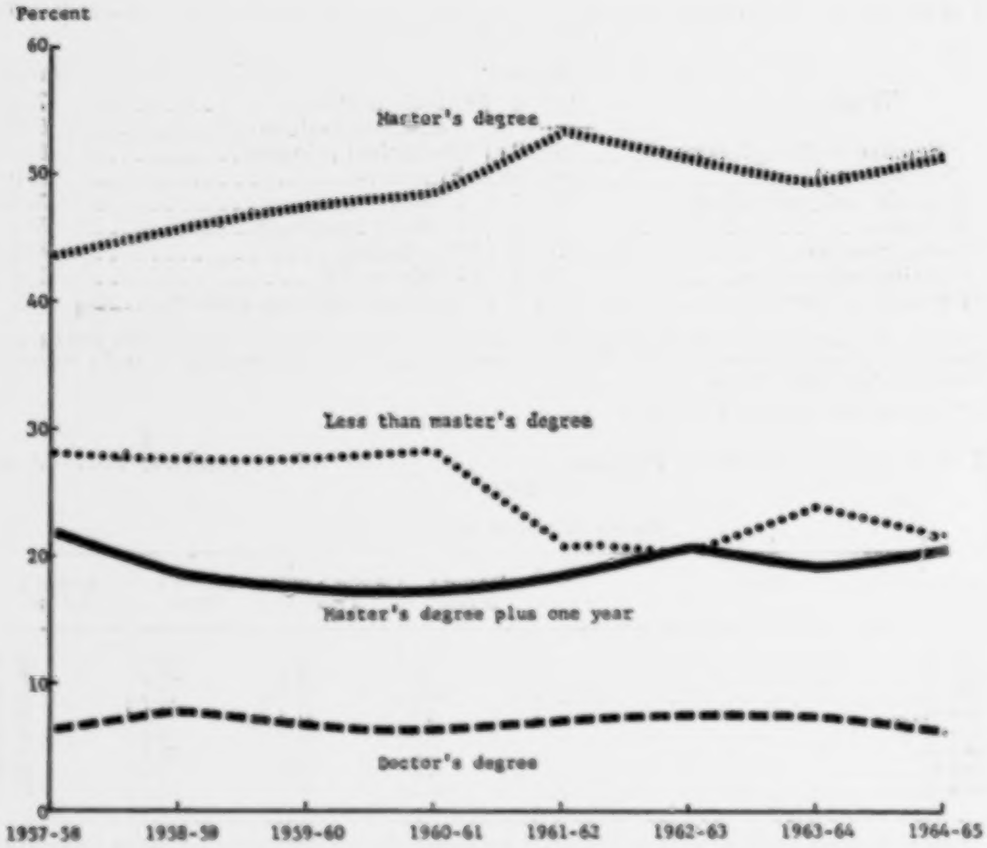

FIGURE XI-1.—*Academic preparation of new junior college teachers*

Source: Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963-64 and 1964-65* (Research Report 1965-R4; Washington, D.C.: National Education Association, 1965), p. 36.

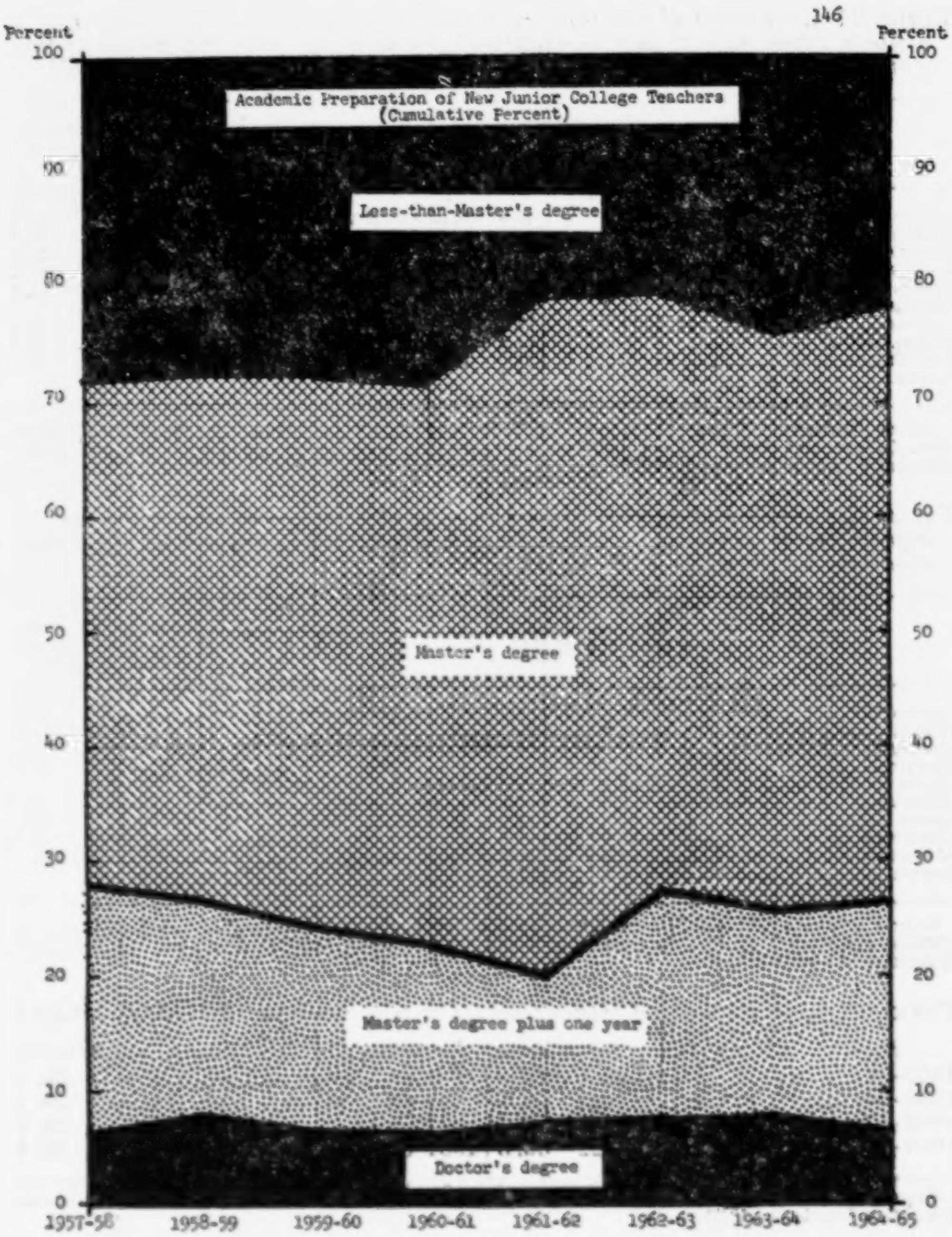

FIGURE XI-2

Source: NSF; based on Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963-64 and 1964-65* (Research Report 1965-R4; Washington, D.C.: National Education Association, 1965), p. 36.

TABLE XI–4.—*Percent of new teachers in selected fields with a doctor's degree or a master's degree plus 1 year of additional credit: 2-year academic period ending June 30, 1965, compared with 2-year academic period ending June 30, 1963*

Field	2 years ending 1963	2 years ending 1965	Field	2 years ending 1963	2 years ending 1965
General social studies	32.1	46.9	Mathematics	26.0	25.5
Psychology	47.4	46.6	General business	16.5	23.5
History	40.6	43.3	Art	19.7	21.9
Biology	37.8	39.3	Accounting	24.5	20.2
French	38.9	37.6	Secretarial	13.4	12.4
Chemistry	35.7	33.3	Physical and health education	13.3	11.6
Physics	24.4	30.9	Nursing	10.9	10.5
Music	26.6	29.9	Engineering	12.1	6.7
English	28.2	27.5			
Speech	20.1	27.5			

Source: Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963–64 and 1964–65* (Research Report 1965–R4; Washington, D.C.: National Education Association, 1965).

TABLE XI–5.—*Percent of new teachers in selected fields with less than a master's degree: 2-year academic period ending June 30, 1965, compared with 2-year academic period ending June 30, 1963*

Field	2 years ending 1963	2 years ending 1965	Field	2 years ending 1963	2 years ending 1965
Psychology	6.4	5.2	General business	15.2	19.5
General social studies	6.7	8.3	Art	18.2	19.8
History	3.5	8.4	Physics	22.2	19.9
English	9.7	10.2	Accounting	15.7	25.6
Music	20.1	10.7	Physical and health education	36.9	34.9
Biology	11.5	12.1	Secretarial	25.6	35.9
Speech	14.1	13.2	Nursing	39.9	43.6
Chemistry	15.8	14.9	Engineering	41.8	50.8
Mathematics	12.8	17.3			
French	19.4	17.4			

Source; Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963–64 and 1964–65* (Research Report 1965–R4; Washington, D.C.: National Education Association, 1965).

TABLE XI–6.—*Percentage of women teachers in junior colleges: 1957–58 to 1964–65*

Year	*Percent women*	*Year*	*Percent women*
1957–58	28.0	1961–62	30.9
1958–59	30.9	1962–63	29.1
1959–60	31.4	1963–64	28.8
1960–61	32.5	1964–65	30.4

Source: Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963–64 and 1964–65* (Research Report 1965–R4; Washington, D.C.: National Education Association, 1965).

TABLE XI–7.—*Percentage of women teachers in junior colleges, by selected fields: Combined total for 1963–64 and 1964–65*

Field	*Percent women*	*Field*	*Percent women*
Foreign languages	43.3	Mathematics	19.0
English	41.0	All social sciences	17.0
All business	34.0	Chemistry	16.3
Music	29.0	History	16.2
Art	25.1	All natural sciences	15.8
Psychology	24.5	Physics	7.2
Speech and dramatics	19.8		

Source: Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963–64 and 1964–65* (Research Report 1965–R4; Washington, D.C.: National Education Association, 1965).

TABLE XI-8.—*Number of unfilled teaching positions in 1963-64 or 1964-65, by field and by type of junior college*

Field (1)	All junior colleges (2)	Public junior colleges (3)	Nonpublic junior colleges (4)
Agriculture	1	1	------
Art	5	3	2
Business:			
General	6	4	2
Accounting	2	2	------
Administration and management	5	5	------
Clerical	1	1	------
Salesmanship and merchandising	1	1	------
Secretarial	2	2	------
All other and unspecified	4	4	------
Engineering	15	15	------
English	14	9	5
Foreign languages:			
German	1	1	------
All other modern	8	3	5
Guidance and counseling	2	1	1
Home economics	1	1	------
Journalism	3	3	------
Library	10	9	1
Mathematics	10	7	3
Medical sciences:			
Dental technology	3	3	------
Nursing	9	9	------
All other and unspecified	1	1	------
Music	5	1	4
Natural sciences:			
Biological sciences	2	1	1
Chemistry	7	6	1
Geology	1	1	------
Physics	12	8	4
All other and unspecified	7	5	2
Physical education	5	4	1
Health education	1	1	------
Psychology	4	3	1
Social sciences:			
Economics	2	------	2
Geography	2	1	1
Philosophy	3	3	------
Sociology	5	4	1
All other and unspecified	1	1	------
Speech and dramatics	4	2	2
Vocational-technical:			
General	4	3	1
Criminology	2	2	------
Electricity	2	2	------
Electronics	3	3	------
Refrigeration and air conditioning	1	1	------
Woodwork and construction	1	1	------
All other and unspecified	1	1	------
Total number of unfilled positions	179	139	40
Number of institutions reporting unfilled positions in 1 or more teaching fields	125	97	28

Source: Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963-64 and 1964-65* (Research Report 1965-R4; Washington, D.C.: National Education Association, 1965).

TABLE XI–9.—*Number of junior colleges reporting shortage of qualified teachers, by field, in 1963–64 and 1964–65*

Field (1)	All junior colleges (2)	Public junior colleges (3)	Nonpublic junior colleges (4)
Agriculture	2	2	....
Art	16	10	6
Business:			
General	28	20	8
Accounting	9	8	1
Administration and management	10	9	1
Clerical	2	2	....
Salesmanship and merchandising	7	1	6
Secretarial	20	12	8
All other and unspecified	18	16	2
Education	1	1	....
Engineering	69	62	7
English	116	81	35
Foreign languages:			
Classical	3	1	2
French	8	7	1
German	7	5	2
Spanish	9	6	3
All other modern	90	53	37
Guidance and counseling	10	6	4
Home economics	16	14	2
Journalism	5	5	....
Library science	45	36	9
Mathematics	150	110	40
Medical sciences:			
Dental technology	8	7	1
Medical technology	2	1	1
Nursing	52	47	5
All other and unspecified	1	1	....
Music	16	11	5
Natural sciences:			
Biological sciences	30	18	12
Chemistry	105	84	21
Geology	1	1	....
Physics	132	110	22
All other and unspecified	109	63	46
Physical education	54	41	13
Health education	1	1	....
Psychology	32	23	9
Social sciences:			
General	2	....	2
Economics	19	14	5
Geography	7	7	....
History	3	2	1
Philosophy	9	4	5
Political science	3	2	1
Sociology	25	20	5
All other and unspecified	6	5	1
Speech and dramatics	15	11	4
Vocational-technical:			
General	37	35	2
Automotive	2	2	....
Aviation	1	1	....
Apparel technology	1	1	....
Cosmetology	1	1	....
Criminology	2	2	....
Electricity	6	6	....
Electronics	29	27	2
Machine	7	7	....
Printing	1	1	....
Refrigeration and air conditioning	1	1	....
Woodwork and construction	3	2	1
All other and unspecified	15	14	1
All others	6	2	4
Number of institutions reporting shortages in 1 or more teaching fields	467	326	141

Source: Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963–64 and 1964–65* (Research Report 1964–R4; Washington, D.C.: National Education Association, 1965).

TABLE XI-10.—*Number of junior colleges foreseeing a future shortage of qualified candidates: 1964–65*

Field (1)	All junior colleges (2)	Public junior colleges (3)	Nonpublic junior colleges (4)
Agriculture	3	3	------
Art	13	8	5
Business:			
General	24	17	7
Accounting	9	5	4
Administration and management	7	7	------
Clerical	2	2	------
Salesmanship and merchandising	3	1	2
Secretarial	11	4	7
All other and unspecified	21	19	2
Education	2	2	------
Engineering	68	58	10
English	105	86	19
Foreign language:			
Classical	4	1	3
French	3	2	1
German	4	2	2
Spanish	4	2	2
All other modern	82	51	31
Guidance and counseling	10	9	1
Home economics	13	12	1
Journalism	1	1	------
Library	32	25	7
Mathematics	178	131	47
Medical sciences:			
Dental technology	6	6	------
Medical technology	4	2	2
Nursing	54	47	7
Music	14	8	6
Natural sciences:			
Biological sciences	30	21	9
Chemistry	92	76	16
Geology	1	1	------
Physics	120	103	17
All other and unspecified	117	69	48
Physical education	46	36	10
Health education	2	2	------
Health and physical education	1	1	------
Psychology	20	15	5
Social sciences:			
General	2	2	------
Economics	15	12	3
Geography	4	3	1
History	5	4	1
Philosophy	11	6	5
Political science	1	1	------
Sociology	15	14	1
All other and unspecified	4	3	1
Speech and dramatics	7	4	3
Vocational-technical:			
General	47	45	2
Automotive	4	4	------
Apparel technology	1	1	------
Cosmetology	1	1	------
Criminology	1	1	------
Electricity	6	6	------
Electronics	25	23	2
Machine	9	9	------
Metal	1	1	------
Refrigeration and air conditioning	1	1	------
Woodwork and construction	2	2	------
All other and unspecified	5	3	2
All others	3	1	2
All fields	4	2	2
Most fields	2	2	------
Number of institutions reporting 1 or more teaching fields	422	305	117
Number of institutions reporting no teaching fields	144	64	80
Number of institutions reporting	566	369	197

Source: Research Division, National Education Association, *Teacher Supply and Demand in Universities, Colleges, and Junior Colleges, 1963–64 and 1964–65* (Research Report 1965–R4; Washington, D.C.; National Education Association, 1965).

XII. JUNIOR COLLEGE STUDENTS

The junior college, and particularly the community-junior college, has variously been categorized as democracy's college, the people's college, et cetera. The composition of the student body is such as to warrant such designations. Among the students one finds:

> Young high school graduates who want two rather than four years of higher education, in the arts and sciences, or in technical, vocational, or semi-professional programs.
>
> Students eventually bound for a four-year college who want to spend their freshman and sophomore years in their own community, living at home.
>
> Young adults who have not graduated from high school or who, through part-time study, hope eventually to earn a college diploma.
>
> Workers who want to improve their skills, prepare for advancement or for change of employment, or expand their general education.
>
> Housewives interested in homemaking, child care, general education, or preparation for employment or reemployment.
>
> Older people seeking to develop new interests in a wide variety of adult education courses.[51]

In this section an attempt is made to describe the junior college student by briefly analyzing three types of normative data: (1) data on 11th-grade students participating in the National Merit Scholarship Program, (2) data on national norms for entering college freshmen, and (3) data on junior college students who transfer to 4-year institutions.

Selected data from the files of the National Merit Scholarship Corp. give some indication of the relative attractiveness of the junior college to a significant proportion of the more able high school juniors. The 800,000 juniors participating in the March 1965 administration of the National Merit Scholarship Qualifying Test were provided a list of regionally accredited colleges in the United States and were asked to indicate their first preference.[52]

The fact that the junior college is predominantly a local institution is abundantly borne out by these data (table XII–1, p. 88). Only 8 percent of the males (and a like percentage of the females) who indicated a preference for public 2-year colleges selected out-of-State institutions. Out-of-State institutions under private control were much more popular. One-fifth of the males, and two-fifths of the females, who indicated a preference for private 2-year colleges selected out-of-State institutions.

Junior colleges in general were not too popular with participants in the National Merit Scholarship Program in 1965 (table XII–2, p. 89). Only 1 in 20 of the participants selected 2-year institutions, 4 percent selecting those in the public sector, and an additional 1.1 percent those in the private sector. These participants (5.1 percent of the total) selected approximately one-fifth (21 percent) of all institutions which, in turn, enrolled about one-fifth (20 percent) of first-time freshman students.

Although there is a considerable overlap in terms of ability (as measured by the National Merit Scholarship Corp. qualifying test) among students choosing various categories of institutions (Table

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[51] Bud Weidenthal, *Cuyahoga Community College—A New College for a New Society* (Cleveland, Ohio: East Ohio Gas Co., 1966).

[52] Robert C. Nichols, *College Preferences of Eleventh Grade Students* (Evanston, Ill., the National Merit Scholarship Corp., 1966).

XII-3, p. 90), a greater proportion of students selecting 2-year institutions were numbered within the lower ability groupings.

* * * * * * *

The foregoing discussion provided some clues as to the attractiveness of the 2-year institution to high school students who were more than a year removed from matriculation. Recent data issued by the American Council on Education provides us with selected characteristics on *entering freshmen* at 2-year institutions.

Students in 2-year institutions tend to be older than those in 4-year institutions. More than one-third (34.3 percent) of the freshmen in public 2-year schools, and 30.2 percent of those in private 2-year schools, were 19 years of age or older. (The corresponding percentage for all 4-year institutions is 14.9.) To a greater extent than students attending 4-year institutions, they are products of public high schools (about nine in 10 as contrasted with eight in 10—table XII-4, p. 91). The modal high school grade of freshmen in public 2-year schools was a "C," in private 2-year schools, a "C+." The modal grade for freshmen in all 4-year institutions was a "B."

About two-fifths of the freshmen in 2-year schools and, also, of those in 4-year schools plan to obtain a baccalaureate (table XII-5, p. 92). A somewhat smaller proportion, 36.9 percent, of the freshmen in 4-year institutions intend to pursue the master's degree Only about one-fifth, however, of the freshmen in 2-year institutions plan to obtain the master's. Eleven percent of the freshmen in 4-year institutions plan to earn a doctorate (Ph. D. or Ed. D.) and only 5.2 percent in public, and 3.7 percent in private, 2-year schools.

The remainder of this section is concerned with junior college students who succeed in transferring, the data having been culled from three works [53] of the Center for the Study of Higher Education at Berkeley.

(Before proceeding, however, it must be pointed out that national data on the flow of students within the junior college sector, in terms of transfer enrollment versus terminal enrollment, and in terms of attrition, are not available. From data based on a sample study made by the Center for the Study of Higher Education at Berkeley [54] some years ago, it is estimated that: 33 percent of the students who entered a sample of 63 junior colleges transferred (within a period of 4 years) to 4-year institutions; a minimum of 35 percent of those who entered were graduated within a 4-year period; and a minimum of 56 percent of those who graduated transferred to 4-year institutions. Higher percentages probably obtain today. The precise magnitude of the increase, however, is not known.)

The study of transfer students was based on a sample of 4-year colleges and universities located in 10 States, selected on the basis of geographical location and control. All junior college students who transferred to these institutions in 1960 (and met certain other criteria) were included in the study. In addition, for purpose of comparison with the sample of transfer students, a sample of native (nontransfer) students was drawn from the 1962 graduating class. The sample of

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[53] Dorothy M. Knoell and Leland L. Medsker, (1) *Factors Affecting Performance of Transfer Students From Two- to Four-Year Colleges*, (2) *Articulation Between Two-Year and Four-Year Colleges*, and (3) *From Junior to Senior College: A National Study of the Transfer Student.*

[54] Leland L. Medsker, *The Junior College: Progress and Prospect* (New York: McGraw-Hill Book Co., 1960), p. 91.

1960 transfer students had to be supplemented with earlier transfers in order to obtain a sample group of adequate size.

The findings are briefly described in terms of selected characteristics of students, plans for college, impressions of junior college experience, performance after transfer, and a comparison of the performance of transfer and of native students.

The transfer students were found to be quite homogeneous in terms of many personal and academic characteristics, in spite of accepted opinion to the contrary. They pursued general or college preparatory courses in high school and ranked in the upper half of their graduating classes (table XII–6, p. 93). They differed from 4-year college freshman in terms of the educational attainment of their parents, more likely to be less than high-school graduation, and the occupation of the father, more likely to be skilled or semiskilled.

When student characteristics were analyzed on the basis of the type of 4-year institution to which the students transferred, it was found that both the men and the women with the best high school records tended to transfer to the major State universities, while male students with poorer high school records were more likely to go to "other State universities."

Not surprisingly only 5 percent of the students pursued a terminal program while in junior college, with 80 percent taking the transfer program, and the remaining 15 percent a general course of studies (table XII–7, p. 93). More than two-thirds of the transfers (68 percent) were awarded a junior college degree (74 percent of the women and 65 percent of the men).

Students made their decision to attend college and to transfer at various times in their precollege careers (table XII–8, p. 93). About equal percentages said they made their decisions to attend college in elementary school (18 percent), in early high school (21 percent), and after high school graduation (19 percent). About one-quarter (24 percent) had made plans to transfer while in high school; 6 percent after leaving junior college; and the remainder during different points in their junior college careers—freshmen year (25 percent), sophomore year (21 percent), and at completion of program (24 percent).

Only about one-fourth of the transfers designated the junior college as first choice for freshman enrollment (table XII–9, p. 94), and few students gave positive reasons for attending junior college (program offered, informality of atmosphere, etc.) Prominent among the reasons given were low cost, location, employment opportunities, etc. (table XII–10, p. 95).

At the time of transfer, a larger percentage of transfer students chose majors in applied fields such as engineering and business administration than in the liberal arts (table XII–11, p. 96). Highest concentrations were in education (for women) and in engineering and business administration (for men). The social sciences (9 percent), science (6 percent), and mathematics (3 percent) fared relatively poorly. In the spring term after transfer, there was a considerable increase in popularity in the social sciences, with minor (and, perhaps, statistically nonsignificant) changes in the popularity of engineering, mathematics, and science. Two years after transfer, 14 percent of the transfers were majoring in engineering and 12 percent in "science and mathematics" (excluding the social sciences) (table XII–12, p. 96).

Nearly two-thirds of the men and more than half the women expected to go to a graduate or professional school after the baccalaureate. A large number of these were teacher education students, many of whom expected to obtain a master's degree while taking courses required for certification. About 10 percent of the men expected to earn doctorates.

Slightly more than one-quarter (27 percent) of the transfer students had a grade-point average of 3 or more (C=2) at the time of transfer. More than two-thirds (67 percent) had one between 2 and 2.9, inclusive (table XII–13, p. 97). Nearly two-thirds (64 percent) of the transfer students completed their first term after transfer with a grade-point average of C or better and enrolled for the next term. One-fourth of the students enrolled for a second term with a grade-point average below C (table XII–14, p. 97) but only 15 percent appear to have been placed on probation as a result. Attrition by the end of the first term was 11 percent. Five percent of the students withdrew with satisfactory grades, while the remainder (6 percent) received unsatisfactory grades and were in some instances dismissed.

A comparison of transfer students with native students in terms of grade-point average, major field at time of graduation (1962), and graduate degree expectations—shows significant differences in some cases, and little difference in others (table XII–15, p. 98). When a comparison is made between early and late transfers (i.e., respectively, those who did not and those who did complete their lower division education in the junior college), it is found that the late transfers achieve better in terms of grade-point average. The late transfers, on the other hand, seem to do less well than native students during the lower division years, but excel over the native students during the upper division years.

There appears to be little difference in the field distribution of transfer and of native students (table XII–16, p. 98) who graduated in 1962. Thirty-two percent of the transfer, and 34 percent of the native, students majored in the liberal arts. Corresponding figures for "science and mathematics" were 11 percent and 13 percent, respectively. For engineering, similarly, the figures were 10 percent and 9 percent. The major differences between late and early transfers appear in engineering and in business administration. Seventeen percent of the early transfers were in engineering, but only 7 percent of the late transfers. Offsetting this to a considerable extent, 14 percent of the early transfers were in business administration, as contrasted with 21 percent of the late transfers.

A smaller proportion of the transfer students expected to earn graduate degrees, with the early transfers having greater expectations that the late transfers (table XII–17, p. 99). A greater proportion of the native students expected to go on to the doctorate, and a greater proportion of the transfer students, on to the master's degree.

Two years after transfer, 45 percent of the transfer students had graduated (table XII–18, p. 99). By the time another year had rolled around, the figure had risen to 62 percent (table XII–19, p. 99). The percentage "still enrolled" for these two points in time declined from 31 to 9 percent. Attrition was somewhat greater among men than among women.

In spite of seeming inconsistencies in some of the data from the several studies, several characteristics of the junior college student do stand out. He is, on balance, not strongly attracted to the junior college. He is older than the general run of college student, and a product of a lower socioeconomic stratum. Probabilities are that he is less able (in the academic sense), less mobile (in the geographic sense) and less motivated to pursue graduate studies.

TABLE XII–1.—*Popularity*[1] *of various types of colleges with out-of-State NMSQT*[2] *participants, by sex of student: 1965*

College type and sex of participant	*Popularity with out-of-State students*[3]
Males:	
Public:	
Universities	19
Liberal arts colleges	11
Teachers colleges	9
Technological schools	68
2-year colleges	8
Private:	
Universities	51
Liberal arts colleges	39
Teachers colleges	61
Technological schools	30
Theological schools	37
Other professional schools	34
Art schools	60
2-year colleges	20
Females:	
Public:	
Universities	18
Liberal arts colleges	11
Teachers colleges	7
Technological schools	11
2-years colleges	8
Private:	
Universities	46
Liberal arts colleges	42
Teachers colleges	42
Technological schools	23
Theological schools	67
Other professional schools	45
Art schools	63
2-year colleges	39

[1] Defined as "the number of NMSQT participants indicating a given college as their 1st choice."
[2] National Merit Scholarship (corporation) qualifying test.
[3] The percentage of NMSQT participants indicating as their 1st choice a college located in a State different than that in which their high school was located.

Source: Nichols, Robert C. "College Preferences of 11th Grade Students," *NMSC Research Reports* (1966: vol. 2, No. 9), table 5, p. 14.

Table XII-2.—*Popularity*[1] *of various types of colleges with NMSQT*[2] *participants—percentage distribution of 11th grade students participating, of institutions selected, and of 1st-time freshmen enrolled in institutions selected: 1965*

College type	Percentage of—					
	Institutions		First-time freshmen		Participants choosing	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Total	----------	100.0	----------	100.0	----------	100.0
Total public institutions	100.0	38.4	100.0	65.9	100.0	59.2
Public 4-year institutions	66.0	25.4	72.4	47.7	93.3	55.2
Universities	17.5	6.7	38.2	25.2	57.5	34.0
Liberal arts colleges	17.7	6.9	14.5	9.6	13.9	8.2
Teachers colleges	27.3	10.5	17.8	11.7	17.7	10.5
Technological schools	3.5	1.3	1.9	1.3	4.2	2.5
Public 2-year colleges	33.9	13.0	27.6	18.2	6.7	4.0
Total private institutions	100.0	61.7	100.0	34.1	100.0	40.7
Private 4-year institutions	87.0	53.7	92.0	31.4	97.2	39.6
Universities	7.5	4.6	27.0	9.2	38.9	15.9
Liberal arts colleges	70.2	43.3	58.5	19.9	52.6	21.4
Teachers colleges	1.8	1.1	.6	.2	.6	.3
Technological schools	1.6	1.0	2.5	.8	3.0	1.2
Theological schools	2.4	1.5	.7	.3	.5	.2
Other professional schools	1.6	1.0	1.9	.6	.5	.2
Art schools	1.9	1.2	.8	.3	1.1	.4
Private 2-year colleges	13.0	8.0	7.9	2.7	2.7	1.1

[1] Defined as "the number of NMSQT participants indicating a given college as their 1st choice."
[2] National Merit Scholarship (corporation) qualifying test.

Source: Nichols, Robert C. "College Preferences of 11th Grade Students," *National Merit Scholarship Corporation Research Reports* (1966; vol. 2, No. 9). Derived from table 5, p. 14.

TABLE XII-3.—*Popularity*[1] *of various types of colleges with NMSQT*[2] *participants—Percentage distribution according to test score and popularity with high ability students relative to size of institution, by sex of student: 1965*

College type and sex of participant	Percentage test score distribution					Ability—size index[3]
	75 or less	76 to 94	95 to 113	114 to 132	133 or more	
(1)	(2)	(3)	(4)	(5)	(6)	(7)
MALES						
Public:						
Universities	7	21	36	29	7	24
Liberal arts colleges	19	29	32	18	3	7
Teachers colleges	14	32	36	16	2	6
Technological schools	4	14	35	36	11	52
2-year colleges	21	34	30	13	2	1
Private:						
Universities	4	13	28	35	20	49
Liberal arts colleges	7	19	32	29	12	19
Teachers colleges	10	25	35	21	8	15
Technological schools	3	12	29	37	19	44
Theological schools	4	22	36	30	7	16
Other professional schools	17	33	35	12	3	2
Art schools	10	26	34	24	6	21
2-year colleges	23	34	27	14	2	2
FEMALES						
Public:						
Universities	6	21	37	29	7	28
Liberal arts colleges	16	27	34	20	4	13
Teachers colleges	10	29	38	20	3	14
Technological schools	5	17	35	33	10	26
2-year colleges	19	35	32	13	2	2
Private:						
Universities	5	17	31	33	14	45
Liberal arts colleges	7	19	32	29	12	28
Teachers colleges	6	24	39	25	6	20
Technological schools	9	23	36	23	9	23
Theological schools	7	24	36	26	7	14
Other professional schools	14	34	36	14	2	4
Art schools	11	24	35	24	5	25
2-year colleges	18	35	33	12	2	4

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[1] Defined as "the number of NMSQT participants indicating a given college as their 1st choice."

[2] National Merit Scholarship (corporation) qualifying test.

[3] The number of participants with scores above 113 (the top 35 percent) divided by the number of 1st-time freshmen enrolled in the fall of 1964 as reported by the U.S. Office of Education.

Source: Nichols, Robert C., "College Preferences of 11th Grade Students," *NMSC Research Reports* (1966: vol. 2, No. 9), table 5, p. 14.

TABLE XII-4.—*Age (19 or older), type of high school attended, and average grade of entering freshmen, by type of institution and by sex: Fall 1966*

[In percent]

Age, high school and grade	Men and women				Men				Women			
	All 4-year colleges	2-year colleges		Technical institutes	All 4-year colleges	2-year colleges		Technical institutes	All 4-year colleges	2-year colleges		Technical institutes
		Public	Private			Public	Private			Public	Private	
Percentage of students 19 or older	14.9	34.3	30.2	14.7	18.9	38.6	40.0	14.8	11.0	27.8	20.6	11.6
Type of secondary school:												
Public	80.4	91.5	87.4	82.2	81.4	91.9	87.8	82.0	79.4	90.9	86.9	85.3
Private (denominational)	15.3	6.7	9.5	12.7	13.6	6.0	8.8	12.7	17.1	7.8	10.2	12.3
Private (nondenominational)	3.7	1.0	2.7	4.4	4.4	1.2	2.8	4.5	3.1	.8	2.5	2.2
Other	.5	.8	.5	.8	.6	.9	.6	.8	.4	.6	.4	.2
Average grade in high school:												
A or A+	6.4	.8	1.3	14.1	4.5	.5	0.7	13.6	8.3	1.3	1.0	23.0
A−	11.3	2.4	3.4	20.3	8.1	1.3	1.9	19.5	14.5	4.1	4.8	22.3
B+	19.7	7.0	8.2	27.5	15.6	4.5	6.1	27.4	23.9	10.9	10.3	20.2
B	24.1	16.3	18.1	22.2	22.1	12.1	13.4	22.8	26.1	22.9	22.8	11.4
B−	14.4	16.2	17.6	9.1	16.5	14.9	16.4	9.6	12.3	18.2	18.8	1.1
C+	13.9	25.7	25.1	5.0	18.3	28.1	26.7	5.2	9.6	21.9	23.5	2.1
C	9.6	20.6	24.5	1.8	14.0	36.0	31.7	1.8	5.3	19.9	17.3	.8
D	.5	1.9	1.8	.1	.9	2.7	3.0	.1	.2	.8	.5	.0

Source: Alexander W. Astin, Robert J. Panos, and John A. Creager, *National Norms for Entering College Freshmen, Fall 1966* (Washington, D.C.; American Council on Education, 1967).

TABLE XII-5.—*Highest degree planned and probable major field of study of entering freshmen, by type of institution and by sex: Fall 1966*

Degree planned and probable field	Men and women				Men				Women			
	All 4-year colleges	2-year colleges		Technical institutes	All 4-year colleges	2-year colleges		Technical institutes	All 4-year colleges	2-year colleges		Technical institutes
		Public	Private			Public	Private			Public	Private	
Highest academic degree planned:												
None	3.9	11.3	8.0	3.3	4.4	11.5	10.0	3.4	3.4	11.0	6.0	0.5
Associate (or equivalent)	1.3	16.3	21.9	0.1	0.8	11.5	10.2	0.1	1.8	23.6	33.8	0.2
Bachelors degree (B.A., B.S.)	39.0	37.4	40.0	20.3	31.1	37.2	39.8	20.1	46.7	37.7	40.2	23.0
Masters degree (M.A., M.S.)	36.9	21.9	21.5	44.5	35.2	23.6	28.0	43.9	38.6	19.5	15.0	54.2
Ph. D. or Ed. D.	11.0	5.2	3.7	27.8	16.3	6.8	5.9	28.4	5.9	2.7	1.4	16.8
M.D., D.D.S., or D.V.M	4.6	2.7	1.2	3.1	7.5	3.7	2.0	3.0	1.8	1.1	0.4	4.4
LL.B. or J.D	1.5	0.5	0.4	0.5	2.6	0.8	0.7	0.5	0.4	0.1	0.0	0.7
B.D	0.3	0.6	0.7	0.0	0.5	0.7	1.4	0.0	0.1	0.3	0.1	0.0
Other	1.4	4.1	2.6	0.4	1.6	4.2	2.1	0.4	1.3	4.0	3.1	0.3
Probable major field of study:												
Agriculture (including forestry)	1.3	2.8	1.0	0.1	2.6	4.6	2.0	0.1	0.1	0.2	0.0	0.0
Biological sciences	4.3	2.8	2.2	2.6	5.1	3.3	3.4	2.1	3.6	2.1	1.1	11.3
Business	11.5	21.9	27.3	2.4	15.9	21.7	21.7	2.6	7.3	22.1	32.8	0.5
Education	12.6	9.5	11.2	0.5	5.6	6.3	5.8	0.2	19.4	14.2	16.5	5.7
Engineering	7.2	10.5	14.2	58.2	14.3	17.2	28.3	61.1	0.2	0.4	0.3	9.5
English	5.8	2.5	2.4	1.1	2.6	0.9	0.9	0.6	8.8	4.9	3.8	9.4
Health professions (non-M.D.)	3.7	7.5	5.5	0.1	1.0	2.1	1.5	0.1	6.3	15.6	9.4	1.2
History, political science	8.2	4.9	3.6	3.0	9.6	5.9	4.4	2.8	6.9	3.4	2.8	6.1
Humanities (other)	6.1	2.6	3.3	1.0	3.1	2.0	2.8	0.5	9.1	3.5	3.9	8.1
Fine arts	8.2	8.8	8.3	3.3	6.0	8.4	7.3	3.1	10.3	9.3	9.3	5.9
Mathematics or statistics	6.0	1.9	2.0	7.1	6.2	2.2	2.9	6.6	5.8	1.4	1.1	14.7
Physical sciences	3.6	1.7	1.8	10.2	5.9	2.6	3.2	10.4	1.4	0.4	0.4	6.7
Preprofessional	6.4	5.4	2.7	2.9	11.0	7.6	4.7	2.8	1.9	2.0	0.7	3.7
Psychological, sociological, anthropological	9.3	7.6	6.2	2.0	5.8	5.4	4.1	1.3	12.7	10.9	8.3	13.3
Other fields (technical)	1.8	4.3	3.7	0.9	3.1	6.1	5.3	1.0	0.5	1.7	2.2	0.3
Other fields (nontechnical)	2.5	2.7	3.2	3.8	0.7	0.8	0.3	4.1	4.2	5.6	6.1	0.3
Undecided	1.6	2.6	1.6	0.8	1.6	2.8	1.6	0.7	1.6	2.3	1.5	3.2

Source: Alexander W. Astin, Robert J. Panos, and John A. Creager, *National Norms for Entering College Freshmen, Fall 1966* (Washington, D.C.; American Council on Education, 1967).

TABLE XII-6.—*Transfer student self-report of rank in high school graduating class, by sex and type of 4-year college*

[In percent]

Type of 4-year college	Sex	High school rank				Unknown
		Top 10 percent	Top quarter	Top half	Bottom half	
Major universities	M	26	32	29	11	1
	W	45	31	17	5	1
Teachers colleges	M	12	27	43	16	1
	W	36	30	29	6	0
Other State colleges and universities	M	18	28	37	15	2
	W	35	32	27	4	1
Private colleges	M	15	28	37	19	1
	W	26	21	35	13	3
Technical schools	M	18	31	34	17	0
Total	M	20	30	33	16	1
	W	38	30	25	6	1
	T	26	30	30	13	1

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-Year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif. 1964).

TABLE XII-7.—*Percentages of transfer students who pursued various types of junior college programs and who earned junior college degrees*

Type of 4-year college	Type of junior college program pursued									Degree earned		
	Transfer			Terminal			General					
	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total
Major universities	88	85	88	3	1	2	9	14	10	61	72	64
Teachers colleges	66	73	68	9	6	8	25	21	24	66	72	69
Other State colleges and universities	81	81	81	2	2	3	16	16	16	74	79	76
Private colleges	73	67	71	5	12	7	22	21	22	63	68	64
Technical schools	54	------	54	28	------	28	18	------	18	65	------	65
Total	81	79	80	5	4	5	14	17	15	65	74	68

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-Year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-8.—*The times at which various percentages of men and women decided to attend college and to transfer to a 4-year college*

Time of decision about college and transfer	Men	Women	Total
About college:			
Elementary school	13	27	18
Junior high school	13	15	13
Early in high school	21	20	21
Junior year in high school	6	6	6
Senior year in high school	12	9	11
After high school	24	10	19
Didn't remember	11	13	12
About transfer:			
High school	24	24	24
Junior college:			
Freshman year	25	26	25
Sophomore year	21	20	21
At time of completing program	23	25	24
After leaving junior college	7	5	6

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-9.—*Types of colleges named by various percentages of men and women as 1st choices for freshman enrollment, by type of 4-year college to which they transferred*

1st choice for freshman enrollment	Type of 4-year college to which students transferred									Total		
	Major universities		Teachers colleges		Other State colleges and universities		Private colleges		Technical schools			
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Men	Women	Total
In-State colleges: [1]												
Major State university	38	36	18	13	23	20	18	6	1	28	23	27
Other public 4-year colleges	4	2	30	23	25	25	3	6	28	14	17	15
Junior colleges	27	23	25	28	21	23	18	23	25	25	24	24
Private four-year colleges	9	12	8	10	10	12	33	27	23	12	13	12
Out-of-State colleges: [1]												
Public 4-year colleges	7	6	9	6	10	8	6	11	11	7	7	7
Junior colleges	1	5	1	3	1	2	1	7	0	1	4	2
Private 4-year colleges	11	14	8	6	9	9	19	16	10	11	11	11
Other [1]	3	2	1	1	1	1	2	4	2	2	1	2

[1] "In-State" refers to colleges located in the State in which the high school from which the student graduated is located. "Out-of-State" refers to colleges in all other States, "other" to foreign institutions, service academies, and other miscellaneous institutions of higher learning.

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-Year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-10.—*Student ratings of the importance of various reasons for attending junior college*

[In percent]

Reason for attending junior college	Sex	Rating of importance				
		Most important	Of considerable importance	Of some importance	Of minor importance	Of little or no importance
Low cost	M	36	32	16	6	10
	W	36	27	15	8	14
	T	36	30	16	7	11
Closeness to home	M	18	31	21	12	27
	W	22	30	20	12	16
	T	19	31	21	12	17
Opportunity to work while attending college	M	14	21	16	11	37
	W	10	15	13	9	52
	T	12	19	16	10	42
Uncertainty about plans for major or career	M	10	14	16	11	49
	W	11	12	13	10	54
	T	10	13	15	11	51
Type of program and courses offered	M	9	25	29	17	20
	W	9	28	30	15	18
	T	9	26	30	16	19
Felt unprepared for senior college work	M	9	10	13	12	55
	W	7	7	10	10	66
	T	8	9	12	11	59
Parents wanted it	M	5	12	17	16	50
	W	14	20	20	14	32
	T	8	14	18	15	44
Atmosphere, informality of junior college	M	3	10	23	22	41
	W	5	18	22	21	34
	T	4	12	23	22	39

Source: Dorothy M. Knoell and Leland L. Medsker, "*Factors Affecting Performance of Transfer Students From 2- to 4-Year Colleges: With Implications for Coordination and Articulation*" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-11.—*Percentages of students choosing various majors in junior college and after transfer* [1]

A. MAJORS IN LIBERAL ARTS AND SCIENCE

Major and time of choice [1]	Men	Women	Total
Social science:			
Junior college	8	10	9
After transfer	13	16	15
Lanaguage arts:			
Junior college	3	12	6
After transfer	5	16	8
Mathematics:			
Junior college	3	3	3
After transfer	4	3	4
Science:			
Junior college	7	4	6
After transfer	9	5	8
Humanities, fine arts:			
Junior college	2	6	3
After transfer	3	6	4
Preprofessional:			
Junior college	3	1	3
After transfer	3	1	2
Group or general:			
Junior college	2	3	3
After transfer	2	3	2

B. MAJORS IN APPLIED FIELDS

Major and time of choice [1]	Men	Women	Total
Business administration:			
Junior college	15	7	12
After transfer	22	7	17
Engineering:			
Junior college	22	<1	15
After transfer	21	<1	14
Education:			
Junior college	2	20	7
After transfer	3	30	11
Agriculture:			
Junior college	3	<1	2
After transfer	4	0	3
Industrial arts, home economics:			
Junior college	1	4	2
After transfer	2	4	3
Physical education, recreation:			
Junior college	2	2	2
After transfer	3	5	3
Nursing, pharmacy:			
Junior college	2	3	2
After transfer	1	3	2
None or unknown:			
Junior college	25	28	26
After transfer	4	3	4

[1] Students were asked to indicate choices they had made at the time they left the junior college and in the spring term after transfer to the 4-year college.

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From Two- to Four-Year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-12.—*Percentages of students in various major fields 2 years after transfer, by type of 4-year college and sex*

Final major field	Men	Women	Total
Liberal arts	28	41	33
Science and mathematics	14	8	12
Business administration	23	6	16
Engineering	19	<1	14
Education	5	40	17
Other applied fields	8	6	7

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-Year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-13.—*Percentage distributions of junior college grade-point averages presented at time of transfer*

Junior college grade-point average [1]	Total number	Percent [2]	Cumulative percent [3]
4.0	24	1	99
3.8 to 3.9	116	2	97
3.6 to 3.7	222	3	94
3.4 to 3.5	355	5	89
3.2 to 3.3	441	7	82
3.0 to 3.1	618	9	73
2.8 to 2.9	763	11	62
2.6 to 2.7	914	13	49
2.4 to 2.5	1,033	15	34
2.2 to 2.3	978	15	19
2.0 to 2.1	908	13	6
1.8 to 1.9	295	4	2
1.6 to 1.7	87	1	1
1.5 and below	38	1	
Total number	6,792		
		Grade-point	
Upper quartile		2.98	
Median		2.56	
Lower quartile		2.22	

[1] C=2.00.
[2] Percentage of students earning a grade-point average in each interval.
[3] Percentage of students earning a grade-point average below each interval.

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-Year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-14.—*Summary of academic status of transfer students following their 1st term at the 4-year colleges, by type of college to which they transferred*

[In percent]

Status	Sex	Type of 4-year college					Total
		Major universities	Teachers colleges	Other State colleges and universities	Private colleges	Technical schools	
Continued with C average or above.	M	59	66	64	66		63
	W	63	73	75	73		70
	T	60	70	68	68	57	64
Continued with average below C.	M	30	23	26	27		27
	W	25	19	16	18		20
	T	28	21	23	24	25	26
Withdrew during term, no penalty.	M	2	3	3	1		2
	W	2	2	1	2		2
	T	2	2	1	1	2	2
Withdrew during term, poor standing.	M	1	0	<1	<1		1
	W	1	0	0	<1		<1
	T	1	0	<1	<1	3	1
Withdrew after term, average above C.	M	2	1	2	3		2
	W	4	1	4	4		3
	T	2	1	2	3	5	3
Withdrew after term, average below C.	M	3	3	3	2		3
	W	4	4	2	2		3
	T	3	3	3	2	5	3
Dismissed after term	M	3	4	2	1		3
	W	1	2	1	1		1
	T	3	3	2	1	3	2

NOTE.—Since only 5 women were included in the sample of type 5 institutions, findings for men and women were combined.

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-Year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-15.—*Cumulative percentile distributions*[1] *of grade-point averages earned by native and junior college transfer students*

Grade-point average	Student comparison group	Lower division[2]	Upper division
3.8 to 4.0	Native	99	98
	1960 transfer	96	99
	Early transfer	96	99
3.6 to 3.7	Native	96	94
	1960 transfer	92	96
	Early transfer	92	98
3.4 to 3.5	Native	92	87
	1960 transfer	84	92
	Early transfer	87	94
3.2 to 3.3	Native	86	77
	1960 transfer	76	84
	Early transfer	81	90
3.0 to 3.1	Native	78	65
	1960 transfer	65	73
	Early transfer	72	82
2.8 to 2.9	Native	68	50
	1960 transfer	52	61
	Early transfer	60	71
2.6 to 2.7	Native	56	33
	1960 transfer	38	44
	Early transfer	46	56
2.4 to 2.5	Native	40	18
	1960 transfer	24	26
	Early transfer	34	36
2.2 to 2.3	Native	23	7
	1960 transfer	12	11
	Early transfer	19	19
2.0 to 2.1	Native	9	1
	1960 transfer	3	1
	Early transfer	5	3
1.8 to 1.9	Native	3	<1
	1960 transfer	<1	<1
	Early transfer	1	<1
1.6 to 1.7	Native	1	<1
	1960 transfer	<1	<1
	Early transfer	<1	<1

[1] The percentile rank for each grade-point category represents the percent of the students whose averges were below those in the category.

[2] Lower division is the junior college in the case of the transfer students.

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-Year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif. 1964).

TABLE XII-16.—*Major fields of the 1962 graduates in the junior college and native student comparison groups*

[In percent]

Major field	Comparison groups			
	Junior college transfers			Natives
	1960	Before 1960	Total	
Liberal arts	31	33	32	34
Science and mathematics	11	11	11	13
Engineering	7	17	10	9
Education	23	17	21	18
Business administration	21	14	19	17
Miscellaneous applied	7	8	7	9

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-Year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-17.—*Graduate degree expectations of native and junior college students in the graduate comparison groups: 1962*

[In percent]

Graduate degree expectations	Student comparison group	Men	Women
Master's	Native	37	49
	1960 transfer	43	46
	Early transfer	39	49
Ph. D. or Ed. D	Native	18	5
	1960 transfer	13	6
	Early transfer	12	11
Medical	Native	5	<1
	1960 transfer	3	<1
	Early transfer	3	1
Law	Native	9	1
	1960 transfer	6	<1
	Early transfer	5	1
Other [1]	Native	3	10
	1960 transfer	3	4
	Early transfer	3	9
No graduate work planned	Native	28	35
	1960 transfer	32	43
	Early transfer	38	29

[1] Teaching credential or theological degree.

Source; Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-Year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-18.—*Summary of the academic status of students 2 years after transfer to 4-year colleges: 1962*

[In percent]

Status	Men	Women	Total
Graduated: [1]			
June 1962	32	43	34
Earlier	2	3	3
Summer 1962	8	9	8
Still enrolled:			
GPA=C or above	28	20	25
GPA=below C	7	3	6
Withdrawn:			
GPA=C or above	8	15	9
GPA=below C	8	7	8
Dismissed for scholarship	12	7	11

[1] Percentages of graduates are based on the numbers of students who transferred with junior or subjunior standing, rather than the total number of transfers.

Source: Dorothy M. Knoell and Leland L. Medsker, "Factors Affecting Performance of Transfer Students From 2- to 4-year Colleges: With Implications for Coordination and Articulation" (Cooperative Research Project No. 1133, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

TABLE XII-19.—*Summary of the academic status of students 3 years after transfer to 4-year colleges: 1963*

[In percent]

Status	Men	Women	Total
Graduated	61	64	62
Still enrolled	10	4	9
Not enrolled and not graduated:			
Voluntary	17	24	19
Dismissal	12	8	10
Total	29	32	29

Source: Dorothy M. Knoell and Leland L. Medsker, "Articulation Between 2- and 4-Year Colleges" (Cooperative Research Project No. 2167, Center for Study of Higher Education, University of California, Berkeley, Calif., 1964).

XIII. The Programs

Junior colleges afford prospective students a wide range of program choice. They may enroll in various curricula in transfer, terminal, or "continuing education" programs.

A few junior colleges prescribe a common liberal arts program, with elective options, for almost all transfer majors. More frequently, however, lower division programs ostensibly provide for some measure of specialization, which will be accentuated in upper division programs. (In view of the fact that, in general, 4-year institutions do not require the lower division student to designate a major until late in the sophomore year, one can question the success of the junior college in requiring an earlier selection, on the one hand, and in differentiating closely allied majors, on the other.) Terminal programs are available for numberless occupations. Adult programs abound, usually as specialized evening courses.

The wide diversity of offerings is reflected in table XIII–1, (p. 103), which presents data on the number of institutions which offered programs of study (transfer, terminal, or both) in 50-odd subject matter fields (curricula) in 1962–63. According to the American Association of Junior Colleges, there were 655 junior colleges in existence that year.

Transfer programs predominated, the 10 most common curricula in descending order, being: liberal arts (offered by 493 junior colleges as a transfer curricula only), teaching (358), pre-engineering (298), pre-dentistry (242), physical science (249), biological science (233), physical education and recreation (226), prelaw (211), pre-pharmacy (210), and music (206).

Other curricula in which transfer-only programs were offered by more than 100 junior colleges were: premedical (149), medical technology (155), nursing (140), preveterinary (147), accounting (109), administration and management (135), general business (154), agriculture (198), forestry (150), art (157), speech (152), home economics (180), architecture and architectural drafting (161), journalism (171), and religion (115).

By far the most prevalent terminal program was secretarial-clerical, offered by 216 junior colleges (offering that curriculum as a terminal-only program). Next most popular was electrical-electronic (engineering technology), with 93 junior colleges. Others among the top 10: drafting, 79 junior colleges; medical-secretarial, 73; mechanics (vocational-technical), 72; salesmanship and retailing, 69; electrical-electronic (vocational-technical), 67; metal and machines (vocational-technical), 60; nursing, 59; and mechanical (engineering technology), 56. All of these curricula were also offered as transfer programs; only nursing, however, was more popular as a transfer than as a terminal program.

The 10 curricula which are provided most frequently as both transfer and terminal are the following: nursing, 89 junior colleges; general business, 82; secretarial-clerical, 75; administration and management, 61; art, 57; architecture and architectural drafting, 56; accounting, 53; liberal arts, 51; home economics, 46; and agriculture, 37.

The 50-odd curricula enumerated in table XIII–1 (p. 103) are the most common ones. The larger junior colleges offer separate transfer curricula in subjects subsumed under "liberal arts" or "general education"; for example, in anthropology, economics, English, foreign languages, history, mathematics, philosophy, political science, psychology, social science, social service, and sociology. Terminal programs not listed in table XIII–1 (p. 103), but which not infrequently appear in the catalogs particularly of the larger junior colleges are the following: cosmetology, fire science, gunsmithing, mortuary science, photography, real estate, and watch repairing. Occurring less frequently are the following: airline hostessing, barbering, boating, equitation, secretarial homemaking, transportation, and upholstery.

In short, by far the most popular curricula offerings are within the medical sciences area. It is clear that the 2-year college has become an important source of personnel in the medical, dental, and veterinary professions, mainly through the preprofessional, transfer programs. Paramedical fields (nursing, medical-secretarial, dental assisting, etc.) figure prominently among both transfer and terminal programs. The various areas of business study are next in importance.

The vocational-technical curricula are common, especially as terminal programs. Some of these are difficult to distinguish from the engineering technology curricula. A not-too-well-defined line of demarcation between the two is drawn on the basis of the relationship of theoretical to practical content, in some instances, and, in others, on the basis of length of program.

The engineering technology curricula in junior colleges are of particular importance in that they provide many of the technicians who become supporting personnel for the Nation's scientists and engineers. As the interdependence between science and industry has grown, the demand for those who can apply the findings of science to the improvement of industrial practices has increased sharply. The modern engineering technician occupies a position between the engineer and the skilled worker. His job is to translate the ideas of the engineer into working plans to be followed by the shopman in producing a product or carrying out a testing procedure. He must be acquainted with the associated engineering field and also with the detailed work procedures involved.

The engineering technician curriculum is postsecondary, is most generally terminal, and provides instruction in theory and applications related to science and technology. It is not to be confused with preengineering instruction, in which the courses are designed to prepare the student for further study leading to a baccalaureate. Neither is it to be confused with vocational-technical education at either the junior college or the secondary school level, since programs at this latter level are designed to train craftsmen with varying but lesser degrees of skill. The availability of these several options on a single junior college campus provides the student with the opportunity to move fairly readily from one level to another as he becomes better acquainted with each and with his own capabilities and interests. The freedom to change from one curriculum to another without moving to a different institution is particularly advantageous.

Recognition of the need for engineering technology curriculums can be traced back a number of years. In 1931, the Society for the Promotion of Engineering Education (the forerunner of the American

Society for Engineering Education) published a report [55] on the training of technicians which identified 18 institutions offering adequate technical sequences and called for the establishment of about 230 more specialized technical institutes within a few years to meet the needs of the engineering profession. A national survey conducted in 1957 reported [56] that 144 institutions offered such curriculums. The U.S. Office of Education reported the existence of such curriculums in 341 institutions, including 4-year institutions, in 1962–63.[57]

Significant numbers of technicians are trained on the job, or in institutions specifically created by an industry or an employer. Some technical institutes are founded to meet particular needs of a geographical area. However, the vast majority of new institutions offering technical training also offer transfer programs for the academically oriented, and thus are more properly classified as comprehensive 2-year colleges.

The junior college is sometimes described as being "many things to many people." [58] The unkind critic, perusing the incomplete list of curricula presented in table XIII–1 (p. 103), might be tempted to ask whether it was not attempting to be "all things to all men." The seeming proliferation of curricula would, however, seem to be inevitable, given the stated objectives of the junior college, and particularly the more numerous community junior college. It is an inevitable concomitant of a student-centered orientation. The questions which inevitably present themselves to the (science) content-oriented critic are: What is the social cost in terms of the possible dissipation of scarce (particularly, staff) resources? What types of science are appropriate within this heterogeneous, amorphous, student-centered complex which is the junior college segment of higher education?

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[55] William E. Wickenden and Robert H. Spahr, *A Study of Technical Institutes.*

[56] G. Ross Henninger, *The Technical Institute in America* (New York: McGraw-Hill, 1959), p. 4.

[57] Brunner, Ken August, *Guide to Organized Occupational Curriculums in Higher Education* (Washington, D.C., GPO–USOE, 1965).

[58] American Association of Junior Colleges, *Many Things to Many People* Washington, D.C.: (American Association of Junior Colleges, 1966).

TABLE XIII-1.—*Number of junior colleges offering transfer, terminal, and both transfer and terminal programs in selected curriculums: 1962–63*

Curriculum (total, 8,372)	Transfer	Terminal-occupational	Both transfer and terminal
Medical sciences (1,638):			
Predentistry	242	0	1
Dental technology	16	8	0
Dental hygiene	35	17	0
Dental assisting	6	26	3
Premedical	149	1	5
Medical secretarial	22	73	7
Medical technology	155	36	11
Nursing	140	59	89
Optometry	84	0	1
Prepharmacy	210	1	1
Therapy	72	11	3
Preveterinary	147	5	2
Business (1,213):			
Accounting	109	52	53
Administration and management	135	24	61
Data processing	7	28	8
Secretarial and clerical	57	216	75
Salesmanship and retailing	34	69	24
General	154	25	82
Live sciences (653);			
Agriculture	198	15	37
Biological sciences	233	1	8
Forestry	150	3	8
General studies (650):			
Liberal arts	493	3	51
General education	55	15	33
Fine arts (647);:			
Art	157	16	57
Music	206	15	25
Speech and drama	152	8	11
Vocational and technical (560):			
Aviation	4	15	2
Clothing technology	29	13	4
Construction	3	48	2
Electricity-electronics	8	67	6
Food and hotel technology	15	9	0
Industrial arts	86	8	23
Metal and machines	1	60	5
Mechanics	6	72	6
Printing	4	16	3
Other	11	27	7
Engineering technology (533):			
Aeronautical and aerospace	9	6	1
Air conditioning	2	20	0
Architectural and civil	19	39	6
Chemical	29	19	9
Electrical-electronic	33	93	11
Industrial	24	26	2
Mechanical	30	56	6
Metallurgical	5	12	2
Other	26	37	8
Teaching (358)	340	7	11
Preengineering (306)	298	2	6
Physical education and recreation (250)	226	4	20
Physical science (249)	235	3	11
Home economics (241)	180	15	46
Architecture and architectural drafting (223)	161	8	56
Prelaw (217)	211	1	5
Journalism (187)	171	5	13
Drafting (131)	35	79	17
Religion (124)	115	2	7
Library science (99)	91	3	5
Police science (91)	52	16	23

Source: Based on data in "American Junior Colleges," 6th ed., 1963, American Association of Junior Colleges, app. IV.